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ABSTRACT

In this report, the formation and use of a creative movement program by a group of Israeli educators as a means of promoting intellectual development in culturally disadvantaged children, mostly of North African and Asian origin, is described. The theoretical framework of the experiment, based on the work of Piaget and other educational researchers who recognized the role of psychomotor activity in the process of concept formation and the development of intellectual skills in young children, is outlined. Methods of working in creative movement are detailed and the research methodology for evaluating its effectiveness with children of low educational and socioeconomic status is explained in detail. The research upon which this report is based was undertaken in order to discover additional methods for education of the culturally disadvantaged. It is hypothesized that the inclination of culturally disadvantaged children towards movement and expression through movement makes it possible to promote the formation of basic concepts and to assist in the development of characteristics considered important to intellectual performance. Charts comparing the control group to the research group tabulate the effects of the program on such things as mathematic ability and test scores. (Author/WI)

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The Use of Creative Movement for Promoting the Development of Concept Formation and Intellectual Ability in Young Culturally Disadvantaged Children

FINAL REPORT

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THE NCJW RESEARCH INSTITUTE FOR INNOVATION IN EDUCATION

July 1974

The School of Education

The Hebrew University of Jerusalem

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ABSTRACT

The report describes the use of creative movement as a means of promoting intellectual development in culturally disadvantaged children.*

The theoretical framework of the experiment has emerged from the work of Piaget, and other educational researchers, who recognized the role of psychomotor activity in the process of concept formation and the development of intellectual skills in the young child. The child makes his first contact with the world through movement of his own body and through the manipulation of objects. During the process of intellectual development, as defined by Piaget, the child passes from the stage of overt motor activities, through the stage of the internalization and the replacement of this activity by movement representations, to the stage of concrete, and later of formal operations, which are no longer dependent on overt activity.

The work presented in the report was undertaken in order to discover additional methods for the education of the culturally disadvantaged. It suggests that creative movement may be used as a method for promoting concept formation and development of thinking in young children. Attention was also given to more extensive educational applications of this medium, such as the development of creativity and imagination, emotional expression, the development of sensitivity and the ability to cooperate. We hypothesize that the inclination of culturally disadvantaged children toward movement and expression through movement, in addition to other factors, makes it possible to promote the formation of basic concepts and even to assist in the development of characteristics considered important to intellectual performance through the use of structured psychomotor activity.

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* In Israel children of low educational and socioeconomic status, mostly of North African and Asian origin.

The instructor presents the children with movement tasks embodying the concept to be dealt with, e.g. size, direction in space, etc. At first, the tasks are quite simple gradually becoming more complicated and demanding a higher level of understanding and coordination. Within the framework of the movement-tasks, the child is encouraged to find his own personal solution. An important principle in the method is the availability and the acceptability of alternative solutions to the same tasks. When a concept has been well-established in one form, it is presented in other contexts and forms, in order to avoid stereotyped thinking. An important principle is the constant emphasis on the relationship between the movement and the verbal conceptualization.

Two of the main objectives of the suggested structured method are: 1) Development of a reciprocal relationship between movement, verbalization and conceptualization, and 2) Maximal activation of the children toward exploration and discovery. We suggest principles of didactics and methodology and present examples to demonstrate the method. Research conducted to test the aforementioned hypotheses underlying the method is presented. The research was conducted over a period of two years on a sample of culturally disadvantaged children. During the first year, a pilot study was conducted in the second grade, and during the second year research was conducted in pre-school kindergartens.

The first aim was to test the effect of creative movement on the development of mental characteristics which are considered important in intellectual performance, such as verbal expression and conceptualization of motor activity, development of flexibility, multi-directional co-ordination, space orientation, shape conceptualization, increased concentration and attention, affective control and development of creativity. It was decided not to employ quantitative measures of these abilities, but rather to study directions of development through detailed observations during the entire period.

Observations of the kindergarten research sample revealed moderate progress in the following areas: application of relevant, precise verbal expression to specific

movement activities, improved ability to switch from task to task and from concept to concept, multi-directional co-ordination, and space orientation. In the area of creativity, little progress was observed. All the performances were evaluated within the framework of the movement lessons only.

The second aim, more defined and precise, was to assist in the formation of basic concepts through movement. The concepts dealt with were: form, space (directions in space, relationships in space, forms of spatial organization), size and relationships between sizes, quantity (scoring, counting, groups, preservation of quantities), and speed. In the pre-school kindergartens, part of these concepts were evaluated quantitatively. At the beginning and end of the research period, non-motor tests were administered to experimental and control groups, as well as to a middle class group*, and progress rates were compared. An analysis of the quantitative findings shows that in the tests, as in initial performance observed during movement lessons, the initial level of the culturally disadvantaged sample was lower than that of the middle class sample. On the other hand, they developed at an accelerated rate after entering kindergarten. Comparison of the progress rates of the experimental group with that of the control group reveals that on the whole, the experimental group made more progress than the control group, and in certain areas the differential progress was significantly higher in the experimental group. These areas were: visual-motor development as measured by the Bender Gestalt Test, recognition of spatial relationships, ability to relate to sizes and proportions, and a specific aspect of conservational ability.

At the end of the research period, readiness tests for First Grade were given. The results suggest that as a result of work in creative movement, the experimental group was better prepared than the control group for entrance into First Grade.

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* In Israel middle class children are mostly of European-American origin.

These findings indicate that there are grounds for assuming that directed movement activity does indeed increase the "natural development" of culturally disadvantaged children in certain fields. On the basis of this conclusion, we suggest guidelines for directed and structured creative movement activity as an integral part of the educational work of the kindergarten teacher with culturally disadvantaged children, and for teaching concepts and themes. Guidelines for training kindergarten and school teachers in the medium of creative movement are also suggested.

PART ONE: THEORETICAL BACKGROUND

1. Presentation of the Problem: Educational Retardation of Culturally Disadvantaged Children and the Problem of Rehabilitation

The educational retardation of culturally disadvantaged children expresses itself in their failure at school. This failure is already apparent in kindergarten and at the beginning of primary school, and increases in severity with advance through the higher grades. One of the principal characteristics of these children is their difficulty in intellectual functioning. This difficulty is caused by cultural rather than mental retardation. In describing the syndrome of the culturally disadvantaged child (3), researchers note primarily an inferiority in cognitive skills. This is revealed both in the formal aspects of learning, that is, in thought processes, and in the content areas where basic information and fundamental concepts are lacking. In addition to these inferiorities, researchers note defects in motivation and character development, which will be further discussed below.

In different countries, especially the U.S.A. and Israel, many extensive experiments have been undertaken to rehabilitate culturally disadvantaged children and to help them overcome their weaknesses in school. These experiments include new syllabi, teaching methods, enrichment programs, organizational changes, teaching devices, etc. Although this is not the proper forum for a discussion of all these experiments, it is clear that comprehensive solutions have not yet been discovered.

The work presented here was undertaken in order to discover additional methods for the education of the culturally disadvantaged. It suggests that creative movement may be used as a method for concept formation and developing thinking in young children. Attention has also been given to more extensive educational applications of this medium to disadvantaged children. We have viewed creative movement

as a medium both for learning and for self-expression. We present specific and defined movement tasks to the children, but they are directed to find personal solutions to these tasks (see detailed explanation and examples in Part Two).

2. The Importance of Psychomotor Activity in Concept Formation and in the Development of Intellectual Ability

Movement is a fundamental aspect of a person's being. Both the psychologist and the casual observer have noted that the child learns about the world through movement and activity. There are two aspects to his psychomotor activity: The first is the child's own movement, that is, the movement experience which includes dimensions of space, time and force. The second is his manipulation of external objects. These comprise his motor and manipulative experiences.

Piaget (48,47,7) and others after him, such as Minkovich (3), Kohen-Raz (35,2), Ray, Kephart (32,33,34), Kamii (31), Weikart (61), Hainsworth (23), Naville & Blom (45), Feuerstein & Richel (6) and Hunt (28), all point out the importance of psychomotor activity to general developmental processes, and to the development of intellectual ability in particular.

According to Piaget, the child's intellectual development passes through a number of stages which differ quantitatively from one another. Each stage develops from its predecessor and serves as a basis for the subsequent stage. The first is the sensory-motor stage, which lasts from birth to two years. In this stage, there is still no coherent system of intellectual activity, no logic and no language, but the child's activity begins to develop certain structures and some primary elements of organization. Varied and goal oriented manipulation of objects along with experiences of personal movement, are of prime importance here. These develop basic curiosity and fundamental concept differentiation, and form primary psychomotor and conceptual schemata. Fundamental concepts are also developed with regard

to the objective existence of objects. The experience of motor activity and inquisitiveness in this stage is critical to development, and its effect is seen throughout the subsequent stages.

The second stage is the period of preconceptual and symbolic thought, which continues from age two to age four. The next stage, that of intuitional thought, is tightly linked to the second stage. This third stage, which lasts up to seven or eight years of age, brings the child to the stage of concrete operations.

In stages two and three, thought and language, symbolic play, imitation, imagery and the other forms of symbolic activity appear. In part, they are an advanced internalization of the activities previously executed in a concrete, unsymbolic manner. This internalization, however, does not yet reach the level of abstract thought. The child is still in the phase of intuitive, egocentric thought. At this age, formation of the simple and primary concepts of time, space, number and form begins, together with the gradual development of the ability to organize conceptual and manipulative experience in symbolic schemata.

Piaget claims that the child's first spontaneous attempts at symbolic representation appear when he moves his body in an attempt to imitate movements of people and objects. In this process, the child translates his mental image of the object into overt movement.

In the second stage, activities are perceived as images, but the child still has to execute the actual activity in order to create images. In the third stage, when movement representations begin to develop, movements are internalized and movement representations substitute for overt motor activity (35).*

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* "In a broad sense a movement representation is any imagined displacement of the body or its parts, or of any environmental object, without any objectively demonstrable movement of the respective object and without any gross overt

Ray has pointed out five stages in the gradual transition from overt movement to the internalization of movement and to the development of movement representations which are independent of overt movement. He noted that this process of modification of movement and its internalization is consolidated somewhere between the ages of six and eight. Feuerstein and Richel (6, p.90) have expressed this idea in a different way: "Thought is the internal language accompanying internal motor activity, which is a condensation of general motor activity."

The fourth stage, that of concrete operations, lasts from seven or eight till eleven or twelve years of age. In this stage, the logical thought processes created by the internalization of directed and goal-oriented activities with objects, and by the internalization of movement representations, are already present. Concepts and intuitive ways of thought develop gradually into concepts and abstract ways of thought that are generalized and stable. At the same time, the egocentricity characteristic of early childhood begins to disappear. At this stage, the process of concept formation and intellectual development is still connected to concrete activities with objects and movement experience. Concrete operations bring the child to the last stage, which is that of formal operations and abstract, logical and reflective thinking. This stage continues from ages eleven or twelve till the beginning of adolescence.

Formal operations are more numerous, generalized and stable than concrete operations. They are no longer linked to the concrete and actual, but relate to the abstract, possible and probable. They do not necessitate overt, actual activity. As stated above, transition from one stage to another and development within each stage is a gradual result of maturation and experience combined. Piaget stresses

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movement of the body part whose displacement is imagined." (Kohen-Raz (35), p.61). Kohen-Raz, following Piaget, stresses the importance of the development of "movement representations" in the development of spatial orientation and in the internalization of space concepts (35).

that the transition from stage to stage can take place only by independent discovery through direct experience.

In conclusion, it is clear that psychomotor activity has a central function in Piaget's theory of intellectual development.

Certainly until ages six to eight, and even during the period of concrete operations, psychomotor experience is of vital importance to the development of concepts and thought processes. Developmentally, there is a transition from the need for overt activity, through the creation of symbols and non-verbal images, to movement representations which are finally internalized into verbal concepts and thought schemata with no need for actual motor activity (35). As Piaget states, "Thought is interiorized action".

With regard to motor activity, it should be noted that Piaget stresses mainly the manipulation of objects. It seems to us, however, that the child's own movement is equally important to the creation and internalization of such basic concepts as space, force, weight and time, and the formation of systems of relationships and rules based on these concepts.

When we discuss the child's own movement as opposed to manipulation of objects external to his body, we must note the following: on the one hand, the child never moves in empty space but always in relation to his surroundings. This relation includes dimensions of space, force, weight and time. For instance, when the child climbs onto a chair or crawls under a table, he obviously does not execute an active manipulation of these objects. In other words, although he does not move the objects, his own actions show him, for example, the spatial relations and the concepts of direction: above, below; high, low; up, down; his height and size in relation to the chair, table, etc. In this sense, the chair or the table serve as external points of reference which help him to learn concepts and relationships. On the other

hand, when the child is active in the manipulation of objects, his own movement is frequently inhibited and limited. On many occasions, however, an object can be regarded as an extension of the body. For example: when the child pushes a toy, the direction of the movement of the toy, and the force of the toy's movement, are extensions or results of the child's own movement. It seems, therefore, that it is indeed necessary to differentiate between the child's own movement and the manipulation of objects. Since, however, they are both essential elements in the development of psychomotor activity, they are not to be considered as two fundamentally separate modes.

From all the above, we assume that ample and varied psychomotor activity at an early age contributes to cognitive and intellectual development. It is important, however, that motor activity not be vague, but rather directed towards investigation and acquisition of experience which will create the basis for the internalization of concepts and the formation of relationships. The teaching method should consider a reciprocal interaction between movement, movement representations and verbal conceptualizations. This hypothesis seems valid with regard to young children in general and culturally disadvantaged children in particular. This will be discussed in the following sections. We will first present further support for our hypothesis.

It was Montessori (41), even before Piaget, who noted the importance of movement to the mental development of the young child. According to her, movement experience provides the child with sensory stimuli which are vital to the development of concepts and perception. Steinhaus (57), in discussing the role of motor activity in mental and personality development, stresses the central importance of the "proprioceptors - organs of muscle sense". These pass information to the brain about

movement, body position, muscle tension, etc. Through these receptors, the brain gathers the basic experiences of force, weight, movement, speed and space recognition.

Held's findings, in research dealing with the development of body image and spatial orientation, also support the importance of motor activity. Held (27) showed that in order to widen or change the body image, actual motor activity of parts of the body in co-ordination with the senses is necessary. In other words, mere observation of the parts of the body does not create a body image, unless it is accompanied by the actual activity of these parts of the body.

Bender (14), a psychoanalyst, claims that when the child moves in space and changes the position of his body in relation to the external world and to his own movement axes, he widens and establishes his own body image as well as his concept of the external world with regard to space and time.

3. The Importance of Psychomotor Activity in the Rehabilitation of Culturally Disadvantaged Children

Up to this point, we have discussed Piaget's ideas on concept formation and mental development for children in general. We have noted the importance of psychomotor activity, to his theory and to those of other researchers as well. We shall now discuss the application of this analysis to culturally disadvantaged children. Minkowich (3) summarizes the research based on the ideas of Piaget which emphasize socio-cultural groups or backward ethnic groups. He claims that: "The sequences of development that Piaget found in his original samples, are generally preserved in normal and culturally disadvantaged children in different countries and cultures, but the age at which the child passes from one mode of thought to another varies from child to child and depends on I.Q., socio-cultural background and specific experiences in the area being researched. Disadvantaged children may show a two to

four year lag in concrete operational ability and in the development of basic concepts and relationships. Reversal and grouping ability, as well as use of such concepts as quantity, size, number, weight, space and time are affected. For these children, the transition from stage to stage is slow, and incomplete, and even at advanced stages, their thought schemata remain unstable and ungeneralized. The majority of culturally disadvantaged children remain in the stage of concrete operations and does not reach the stage of formal operations." (3, pages 21-22). He notes that "The culturally disadvantaged child still functions on an egocentric and concrete level at an age when the normal child reveals abstract logical thinking." (3, page 21).

Other investigators (such as Inkeles, Ausubel (3), Miller and Swanson (40)), also note the tendency of culturally disadvantaged children towards the concrete, specific and immediate rather than to the abstract, general and possible. (Frankenstein connects this orientation with the "externalization" which characterizes the culturally disadvantaged child (10,12)).

Several investigators suggest that this tendency towards the concrete, be considered when planning syllabi and teaching methods for culturally disadvantaged children. The tendency toward practicality and activity, for example, should be exploited (Minkowich (3)). Concrete demonstrations should be used extensively and systematically, and school material should be based on daily experience (Ausubel (3)). It seems to us that one should regard creative movement as described in this project as a medium especially suited to the culturally disadvantaged, since it is a concrete motor activity. In further discussing teaching methods, we will stress the importance of starting from concrete, specific and immediate situations and of using them as tools in the transition to the abstract, general and possible. In other words, the teacher must constantly be aware of establishing the link and reciprocity between movement, concept formation and verbalization.

In discussing cognitive rehabilitation of the culturally disadvantaged child, Frankenstein (10,11,12) notes the need to assist the child in discovering his "self" as the center of activity, creativity and productivity on the one hand, and the need to assist him in distinguishing between the subjective "ego" and the objective reality of the external world, on the other. It seems that learning through creative movement serves these purposes, since the starting point is the child himself in concrete, subjective and familiar activity. The child acts through his body which is his own self and through this direct experience, he learns objective, abstract and general concepts and rules which are external to himself.

The few observations that have been done on motor maturation of disadvantaged children have revealed that these children are not inferior to middle-class children in psychomotor abilities and skills. In fact, according to the research of Miller and Swanson (40), it would seem that the lower classes are superior to the middle classes in mastery of psychomotor skills. Miller and Swanson have shown that pre-adolescents from the working classes are motor-oriented in their expressive styles, tend toward the use of gesture, and present events concretely, while middle-class pre-adolescents tend more toward abstract conceptualization and symbolization of the same situations. The authors maintain that these expressive styles, the motoric versus the conceptual, are typical to the two social classes respectively.

Wallach and Martin (60) have shown in their studies, that primary school children of the lower classes revealed greater motor expansiveness than children from the middle classes. They explain this by the dominance of non-verbal expressive styles among the lower classes in contrast to verbal expressive styles among the middle classes.

In describing the Jewish child of North Africa, Feuerstein and Richel (6) note a tendency toward expression through movement. They note the children's spontaneity

in expression through movement on the one hand, and a poverty of their verbal expressiveness on the other.

In her studies on culturally disadvantaged children of kindergarten age, Susan Gray (22) notes that, from the start, the children were more experienced and knowledgable in motor skills than in most other areas. She also notes that the educational patterns of these children at home tend more toward emotional communication through movement and gesture than to abstract and intellectual communication.

Lastly, kindergarten and school teachers who work with culturally disadvantaged children have observed and concluded that culturally disadvantaged children are oriented toward movement and expression by movement, and are enthusiastic about activities such as dancing and rythmics.

In conclusion, culturally disadvantaged children tend toward the concrete, they are not backward in their motor development, and there is evidence that they especially tend toward movement and expression through movement. If we add to this what we know of the importance of psychomotor activity to the development of concepts and thought, it seems to us that creative movement can indeed serve as an effective method of working with culturally disadvantaged children.

A question must be raised here: We note that culturally disadvantaged children are not backward in their motor development and that they tend especially toward movement and expression through movement. In view of the importance of psychomotor activity to intellectual development, how can we explain the intellectual backwardness of this population? It appears that spontaneous movement experiences are not sufficient. It is necessary to process and assimilate these experiences by comments, guidance, and especially by verbalization on the part of the adults in the child's environment. This is exactly what the culturally disadvantaged child lacks. The adults in his environment, his mother and other family members, do not

assist the infant in making use of movement experiences in order to form conceptual systems. By not speaking to him often enough, they do not help in interpreting and organizing the experiences and information he has acquired into organized and generalized schemata. As a result, he does not learn to verbalize and conceptualize. It is necessary, to provide the child with directed, guided and varied psychomotor activity, accompanied by interpretation, verbalization and conceptualization. That is, the spoken word must be used to establish the link between movements and concepts, while the movement experience must become assimilated into his sytem of conceptual thought.

The culturally disadvantaged child is faced with difficulties in other areas where creative movement may be useful. We have already noted that culturally disadvantaged children like movement and expression through movement, that these succeed in creating positive enjoyment and involvement, and in developing self-confidence and satisfaction. We have noted that the difficulties these children face in academic studies create a vicious circle of failure, frustration, and further failure. We assume that working through a medium that contains inherent possibilities for success and satisfaction will help break this vicious circle.

It is well known that culturally disadvantaged children have special difficulties with language. Many investigators have dwelt on this problem and have noted that the language used by the culturally disadvantaged child is qualitatively and quantitatively deficient (1,3,5,6,15,22,51 and others). Since present teaching methods rely heavily on verbalization, we assume that it would be useful to approach these children through a non-verbal medium as well, using it to teach concepts, and develop mental and emotional capacities which aid the development of language and thought.

Creative movement requires self-activity which inevitably leads to self-

discovery and initiative. In this way, it counteracts the apathy and passivity which have been noted as characteristic of the culturally disadvantaged child (3, 6,11,12,22). Piaget (7,47,48), Frankenstein (10,11,12), Gray (22), Weikart (62) and others, stress the importance of "self discovery" in mental processes and learning.

It is commonly believed that culturally disadvantaged children tend to be rigid, stereotypic and schematic in their thought patterns and in their relations to their environment (6,11). Creative movement emphasizes variety in self-expression and existence of several alternative solutions to a single problem. It can thus develop mental flexibility in the disadvantaged child. This emphasis on variety in expression and in problem solving may also build self-confidence and daring, by reinforcing original solutions and encouraging individuality. The emphasis on the existence and appreciation of individual differences among children is important for both pupil and teacher.

Many of the investigators who consider methods of rehabilitation for the culturally disadvantaged child stress that relating personally to each child and using a differential approach to his individual problems, is an essential requirement of the rehabilitation process. The medium of creative movement allows the application of such an approach.

Those dealing with culturally disadvantaged children note a tendency toward affectivity and lack of control, as expressed in psychomotor activity, mental and

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* Involvement in movement is caused by the mental, emotional and motor experience in which the entire personality is involved. The body itself is the tool, and the body is the person himself. Mastery of the body, expression through the body, and learning through the body, are all direct.

emotional functions and social relationships. Associative thought patterns and deficiences in attention and concentration, are directly connected to this lack of control. Affective control is achieved through a process of gradual maturation. Investigators note that culturally disadvantaged children fall behind normal children of the same age group in their level of control. Feuerstein and Richel (6), note that the North African children they studied revealed inadequate controls and an inability to regulate motor activity. They are of the opinion that since these children have difficulties in verbal expression such uncontrolled body movements take the place of speech. They assume that encouraging psychomotor activity in a controlled and directed way may influence both personality and thought by restraining those body movements that replace speech. In other words, the control and regulation of motor activity will lead to ultimate internalization (see page 7) . Frankenstein (11,12) also notes that affectivity and lack of control inhibit the development of mental functions.

At first, work in creative movement emphasizes individual expression through finding personal solutions to movement tasks, and, at a later stage, it fosters the development of creativity in movement. Several investigators note the potential for spontaneous creativity in groups of culturally disadvantaged children. Bernstein and Riesman (3) have pointed out this phenomenon in the language of culturally disadvantaged children, Gray (22) in the field of expression and spontaneous creativity through music; Feuerstein (6, and in a personal communication) found a high potential for creativity in disadvantaged children. He does not see lack of creativity as a problem of the disadvantaged but rather inability to consolidate creative material and organize it into meaningful forms. Frankenstein (11) discusses the wild imagination of the culturally disadvantaged child and the educational need to control and direct this imagination into productive channels. He

believes that such channelling could result in an increased ability to see the various possibilities of a situation, to look to the future rather than to the present and immediate only, and to discover unexpected relationships between phenomena. Thus exploiting this potential for spontaneous creativity seems a desirable way of arousing motivation, achieving personal satisfaction and stimulating both cognitive and personality development.

4. Summary of Literature

The connection between body, spirit and soul was recognized in antiquity and since then philosophers in every age have dealt with the issue. In the present century, especially in recent years, these connections have become subject to scientific research, and the psychomotor outlook, which recognizes the interaction between physical and mental-spiritual processes, is becoming more and more prevalent. This outlook is to be found in the biological sciences as well as in education and psychology.

Research has recently been conducted on the connection and relationship between physical development, and motor skills and functions on the one hand, and the different aspects of mental development, intelligence and learning ability on the other hand (55,50,29,2). The works of Kephart (33,32), Sharan (13), Hainsworth (23), Naville-Blom (45), Canner (17) and others, describe the use of sensory-motor methods in remedial teaching and in correcting learning problems in low I.Q. children, children with brain injuries and organic deficiencies, as well as children with mental disturbances. Very little has been written about the use of movement in the education of culturally disadvantaged children. However, research and studies in related areas may be relevant to the present study.

"The Cognitively Oriented Curriculum", by Weikart et al. (61), describes a project on the development of teaching and educational methods for culturally disadvantaged pre-school children (Ypsilanti Perry Pre-School Project). Based on Piagetian developmental theory, the program aims at enabling the children to: (a) create meaningful mental representations on three levels - from the index through the symbol to the sign; (b) recognize relationships between objects and events, actual and symbolic. The curriculum has four content areas: sorting, seriation, time and spatial relations.

The Piagetian orientation is further seen in the program's emphasis on two levels of functioning, the motor and the verbal. The motor level is introduced first and the verbal level is added at a later stage, but even when the children are already performing on the verbal level, the motor level remains important. Performance on the motor level is differentiated into direct and indirect involvement (the child moves himself - the child moves objects). Both levels of functioning, motor and verbal, are woven into these representation processes. The approach described in this project is a unique example of work with culturally disadvantaged children in its stress upon the importance of psychomotor activity in concept formation and thought development, and in the integral part such activity plays in the learning process.

Turner and Fisher (58) found that Kephart's program of motor-perceptual exercises had a positive influence on disadvantaged kindergarten children's readiness for school. Testing showed that the program improved fine motor performance but had no influence on gross motor performance. On the basis of the correlation between fine motor skills and reading and writing activities, the investigators assume that the children's increased readiness for school was due to the exercises aimed at the development of these skills.

Friedman-Witkower (9) in Israel used a program of directed and intensive motor movement with culturally disadvantaged children in elementary school. The researchers tested the influence of the program on scholastic achievement, motor achievement, personality traits and developmental age. This was a pilot experiment but the results indicated a positive influence of the program on some of the variables tested.

Muckerji (42) reports on a project of television programs for formal education of culturally disadvantaged kindergarten children. The author notes that of the various subjects dealt with by the project, dance received the most positive response. It aroused participation and interaction in the children, and stimulated activities in other areas. The children reacted with special interest to programs which showed movements of animals, humans and objects.

Other studies report on work with movement and creative dance with children in general, but not culturally disadvantaged children in particular. Dimondstein and Pevots (18), within the framework of the CAREL program, constructed a detailed dance curriculum for three to eight-year-old children, together with an appropriate program for training teachers. The aim of the program was to teach the basics of movement in space, time and force, and to develop creativity through dance. Trained teachers would then include dance and movement as an integral part of their work in school. The program was designed for work with a mixed population, including both middle class and culturally disadvantaged children, but did not relate specifically to the problems of the culturally disadvantaged. The work is based on a method of "problem solving" through movement. Observations revealed positive results in achieving the aims of the program. We should note that progress was evaluated in terms of movement and during movement lessons, but "transfer" to other frameworks and to verbal areas was not noted.

Painter (46) reports an experiment in a middle-class kindergarten. Of the twenty children with the lowest performance level, ten were given methodical treatment in motor, rhythmic and sensory activities for seven weeks, three times a week, for a total of 21 half-hour meetings. In testing, she discovered that the experimental group progressed much farther than the control group in perceptual-motor integration and psycholinguistic ability, and their body image improved.

Stecher (56) suggests the use of movement improvisation as an approach to learning concepts. She reports on her extensive experience in the area and on the role of the teacher in this teaching method. The aims of the method are: to arouse the children to activity and involvement, to concentrate their attention on movement experiences, to concentrate their attention on the solution of a presented problem, to arouse creativity, to develop body consciousness and the ability to relax, to define and identify movement in verbal terms, to clarify and teach concepts, and to develop body-control and self-control. She presents examples of this method in her report.

Kephart, one of the most important practical and theoretical researchers in the education of children with learning problems, was the originator of the "total sensory-motor" approach. His experience indicated that many children who start school are lacking in basic perceptual-motor skills. He claims (33) that in order to help the child in the complex tasks of writing, reading and arithmetic, it is necessary first to assist him in other ways, especially motor ways, in order to build the perceptual-motor skills which serve as a basis for these complex activities.

Johnson (30) reports on his eight years of working with children in a clinic for physical development. His experience revealed that children who have not formed a clear body image in their early childhood, because of a lack of appropriate move-

ment experiences, may be hurt in their overall development and may reveal signs of retardation. On the other hand, he discovered that it is possible to correct retardation and damage of the child's total development by physical experiences which enable the child to study and control the movement ability of his own body. In addition, he claims that movement control is obtained by learning through experience and is not obtained automatically in the process of maturation.

The reports presented here lead to the assumption that movement is a tool with good potential for work with children in general and children with various learning problems in particular. We must add that there are almost no detailed published works which are specifically concerned with culturally disadvantaged children.

PART TWO: THE METHOD OF WORKING IN CREATIVE MOVEMENT

1. Introduction

Both educators and artists note the importance of movement and dance to education. The development of "progressive education" which is child-centered and emphasizes creative activity, on the one hand, and developments in the field of dance which stress varied and individualistic expression on the other hand, have resulted in the recognition of creative dance as an educational medium.

Laban and his school in England (16,37,38,49,53,54), H'Doubler (25), Muckerji (44), Rowen (52) and Van Tuyl (59) in the U.S.A., and many others, have worked in this field and written about it. They note the importance of creative dance in the development of imagination and creativity, in formation of aesthetic concepts, in expressing emotional problems, in fostering socialization and developing sensitivity to others, in achieving self-confidence and developing initiative and, of course, in motor development.

The working method proposed in this paper, is drawn from the theory and practice of creative dance and applies them to the education of culturally disadvantaged children. This paper makes a two-fold contribution to the field. First, it stresses the possibilities of applying creative movement to concept formation and intellectual development. Those dealing with creative dance have not considered the development

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* We distinguish between "dance" and "movement". Dance is an expression of an idea, content, emotion, etc. through movement, and is limited by a certain style. Movement is the basis of dance, but is broader and more general in meaning. Movement is the medium, the language of dance. Every dance is composed of movement, but not every movement is necessarily consolidated into dance. In our educational work, movement precedes dance.

of intellectual ability, while those dealing with cognitive rehabilitation of the disadvantaged have not considered the use of creative movement. Second, our method does not stop at general theory but offers an analytical, detailed and systematic approach to concept formation. In other words, this study should not be regarded as a broad "enrichment" program but as a structured working method with specific and defined aims. Didactic principles and examples will be presented in order to demonstrate the method, theoretically and practically, in work with infants, pre-school children, and first and second graders. Most of the principles, however, are applicable to work in creative movement with any age group. The examples are designed for culturally disadvantaged pre-school children, but of course can be applied generally to kindergarten, and first and second grade children by adaptation to different levels, abilities and difficulties.

2. Guidelines for Work in Creative Movement with Culturally Disadvantaged Children

The following distinctions in modes of movement are to be noted:

a. Movement of the body only with no relation to external factors.

b. Movement of the body in relation to static and passive external objects. Such movement may be in relation to points in space or to an external object such as another child, a building block, a chair.

c. Movement of the body with an object: the movement is passed on to the object, whereby it becomes an "extension" of the body, and an active partner in movement, such as another child, a building block, a stick, a ball, etc. (It is obvious that when the child interacts with another child, many important and additional factors are introduced. This is not so when the interaction is with an inanimate object).

These three modes are important in the process of concept formation and they should

all be used. (For a theoretical comment on this matter, see pages 8-9).

It should be recognized and remembered that not all concepts lend themselves to movement. Concepts of color, for example, cannot be taught through movement. The teacher must be selective in her choice. Appendix no. 2 presents a list of concepts which lend themselves to this medium. In general, it can be said that teaching through movement should be one of the many ways of promoting concept development. Different means should be used to promote the development of those concepts that cannot be dealt with through movement. It is possible to teach general characteristics of form by shaping them with the body, or by movement but fine distinctions (such as oval versus round) are more difficult to teach this way.

Work in movement has two main aims: promoting the development of basic concepts and attempting to develop mental characteristics which are considered important to intellectual functioning (see Part Three, Research Aims).

Our teaching method is based on the following rules:

a. Defined and structured movement tasks relating to the concept which is being developed, are presented to the children. At the beginning, the tasks are short and simple. They demand simple co-ordination and contain only few combinations. Gradually the tasks become more difficult and complex and contain more combinations. Execution of these tasks demands a higher level of understanding and more complicated co-ordination.

b. The children are directed and encouraged to find their own personal solutions within the framework of the movement tasks. In other words, there is not one predictable and pre-defined solution. As long as the child's movement solution does indeed fit the task with respect to the movement components used, it is regarded as a correct solution. At the beginning, imitation in the group and little creativity are to be expected, but it is desirable and possible to lead

the children gradually to variety, personal expression and creativity in their solution.

It is important to show the child that there is more than one solution to a particular movement task for several reasons. First, this may develop creativity in culturally disadvantaged children. Second, this emphasizes the individual worth of each child. Third, it is fundamental to the promotion of concept development and internalization. With regard to internalization, when the same concept appears and is expressed through a variety of movements, one acts against the tendency of disadvantaged children to learn by rote, to know and remember in a mechanical external way, within a limited contextual framework. The child is thus helped to internalize and "know" the concept.

If the concept being dealt with is not known at all or is known incorrectly, it is necessary to first teach the children the correct execution of the presented movement task, or even to request an exact imitation (e.g. the concept of graduation or diagonals) The concept cannot be developed creatively until the correct basis has been established.

c. The same concept is presented in various ways: through pure movement, movement games, within the framework of an imaginative or concrete theme. It is also presented in different contexts. All this is done in order to internalize the concept itself and to prevent the recognition of the concept only in the context in which it was taught. In other words, emphasis is placed on the ability to perform the "transfer" of the concept in different contexts. This "transfer" is implemented through different movement activities and through discussions which clarify the childrens' observations. At this point, it should be noted

that the use of images and themes taken from the life of the children and their environment in order to form concepts, is problematic. On the one hand, use of these images and themes creates motivation, interest and involvement, enriches and enlivens the work, and clarifies the concepts with the help of material familiar to the children. On the other hand, there are stumbling blocks to the process. The themes and images contain so many attractive diversions that they may blur the concept being taught. For this reason, they should be used cautiously. The concept should first be understood thoroughly and only afterwards should it be broadened, varied and "transferred", and its movement characteristics emphasized. For example, in teaching "spatial relationships - above-under" we use the image "child-umbrella". "The child is under the umbrella - the umbrella is above the child." This image arouses interest and involvement and contains numerous movement possibilities for clarifying the relativity of spatial relations. But it includes diversions, such as the shape of the umbrella, and the association of rain. In this case, we shall first develop the concept of spatial relationship, above-under, and only afterwards will this image "child-umbrella" be presented. Thus, the concept of "above-under" will be enriched and expanded together with an emphasis on the movement characteristic and the conceptual basis of "above-under". Special care should be taken when using images and themes with disadvantaged children, because of their tendency toward associative thinking, their lack of focus, and their easy distraction by stimuli external to the nature of the theme.

d. An important extension of the above principles relates to the culturally disadvantaged children's tendency to enter a "set". In other words, there is a tendency toward mechanical, stereotypic knowledge which is characterized by rigidity

and a lack of flexibility in intellectual functioning. It is therefore important to present the same tasks in different sequences, versions and in various contexts. When a certain concept has been studied and has become established and well known, it is very important to repeat it in a different manner. For example: when the basic directions are being taught - "backwards-forwards", "up and down", "to one side-to the other side" - they should be presented in movement tasks in different sequences: "up-forwards-to one side-down-backwards-to the other side", etc. Otherwise, there is the danger that each direction will be known and familiar only when it is presented in a particular order. In the above paragraphs, we discussed the need for flexibility, widening and "transfer" in the broad sense, and here we stress the need for these in a narrower and immediate sense.

e. A strong and persistent emphasis is placed on the creation of a link between movement, movement presentation and verbal conceptualization. This principle is a corner-stone of the method described in the theoretical introduction (pages 6-9). We repeat that all researchers note the poor language of culturally disadvantaged children: restricted vocabulary, vagueness, ad hoc descriptions, imprecise verbal expression, etc. It is therefore always necessary to stress the verbal mediation between movement and conceptualization. This is done in many ways. "Key words" which represent the movement conceptually should be used often. The teacher may repeat the verbal description of the movement activity requested of the children and then ask them also to express their movements verbally. It is important to ensure precision of expression and the correlation between the movement and its verbalization. The application of this principle is two-directional, "do and say", "say and do". The teacher or a child describes the movement activity verbally, and the children perform it, or the children perform the movement activity and they

themselves, or others, describe verbally what is being done. By means of such verbal mediation, the movement activity is established both verbally and conceptually.

The above places emphasis on developing the ability for generalization and abstraction, as the process of abstraction is the essence of conceptualization. The movement activity, on the one hand, and its verbal-conceptual expression on the other hand, are presented at the end as general phenomena, after learning, experiencing and exercising. The children are presented with the common qualities of the different phenomena and with the differences in phenomena which seem similar. For example: in dealing with concepts of form, it is pointed out that it is possible to show a round form with the body, that it is possible to walk in a round path and that it is possible to make a round form in a group. In this case, the ability to generalize and to abstract with regard to the concept "round", is developed. Movement activity is important not only on the concrete level, but is also presented to the children as part of a system of concepts and operations. When the children are guided to observe movements in objects, in nature and in their environment, to analyze their movement characteristics and express this movement with their bodies, the actual process of "translating" the movement of another object to body movement contains elements of identification, discrimination, generalization and transfer.

f. Maximal activation of all participants is demanded during the lessons. Investigators stress the disadvantaged child's tendency to apathy and passiveness. This phenomenon is obvious when listening to discussions between the teacher and a class of disadvantaged children. One will note that the number of participants is usually small, with most children not participating at all. After some time, most of these children cease to follow the discussion, lose attention, sink into apathy. They day dream or

busy themselves with irrelevant matters. Movement, however, demands self-activity, and the fact that children enjoy it makes maximal activation possible. The teacher should be careful to ensure that such activation takes place. Self-activity is essential for "self-discovery", a process whose importance is stressed by those dealing with the rehabilitation of the culturally disadvantaged child.

g. In the beginning of our discussion of working methods, we explained that the children are asked to execute certain movement tasks. It is important to add that the teacher observes and evaluates the child's response to the given task. At times, only part of the children will be active and the rest will observe and evaluate the performance with the teacher. When the child's movement indicates his understanding of the concept on which the task is based, he is reinforced by the teacher. The teacher directs the child towards improving the precision and appropriateness of his response. Thus, the child advances both in the movement performance and in understanding and assimilating the concept being taught. A positive response by the teacher is also given to an original and varied performance, but only when this performance meets the requirements of the stated task. It is important to keep this in mind lest the children be impressed with a beautiful and varied interpretation that draws attention away from the concept being dealt with at the time, from the correctness and from the precision of the performance. We also stress the importance of developing the ability to criticize oneself and others objectively, an ability which culturally disadvantaged children are known to lack.

h. The development of the ability to observe and to discriminate during movement activity is emphasized through movement games in which the children watch movements performed by the teacher, imitate these movements and then develop them further; and through observation of their friends' performance of the movement tasks. The

teacher guides the children to observe and discriminate, and clarifies their observations with them. Development of observation and discrimination are important in and of themselves, but they are also necessary for verbalization, conceptualization, abstraction, and for correction of the movement performance.

It is worth mentioning that observing movement is difficult because movement is essentially ephemeral and, unlike painting or sculpture leaves no tangible traces. In this, it is similar to music. Because of its ephemeral nature, it is extremely important to train children in observing movement. The ability and technique of observation should be developed gradually, from short movement sequences to longer ones, from simple to more complicated movements, from observing one child to observing two, three or a group of children moving. The development of "movement memory" and, of course, the development of attention and concentration, are connected with the development of the ability to observe and discriminate. These, in themselves, are important components of intellectual activity, and are deficient in disadvantaged children.

i. It is necessary to ensure that full, clear and understandable instructions and directions be given to the children. At every step, it should be verified that what is being taught is also being understood. To prevent gaps in knowledge, nothing should be left to chance or to the assumption that the children will understand by themselves. The movement activity should be constantly accompanied by explanations, discussion and verbalization.

j. Lastly, we should remember that culturally disadvantaged children have a very short attention and concentration span and that they are easily disturbed by external diversions. They are also highly influenced by failure. It is necessary

to take special care in programming movement lessons to ensure that they proceed from simple to complex tasks, that the explanations are understandable, and that the tasks are interesting, attractive and varied enough to maintain their attention and concentration. When a didactic error disrupts the teaching process and disturbs attention, concentration and involvement, it is very difficult to restore interest in the same lesson or subject.

The rules described above may create the impression of a rigid and closed method, for although children are encouraged to find their own personal solutions to the given movement tasks they still have to adhere to the limits of the tasks set. In order to moderate this impression, we note that there is much room for flexibility. The teacher should be aware of the children's reactions and ideas in order to introduce productive mutual exchange of ideas. The children's movement reactions should serve as a basis and source for developing work with the concept being dealt with. In addition, the principles described are suitable for work in concept formation, but there is room for additional activity in creative movement with culturally disadvantaged children. This need not necessarily be directed towards concept formation, but towards something more flexible and broad, that is, towards the development of imagination, self-expression, sensitivity to others and an aesthetic sense. The overall approach, then, is wide, flexible and not predetermined.

EXAMPLE: Description of Activities Employed in Working on Concepts of Size

The method of instruction applied in the creative movement lessons is based on the following principles: a) that a well-defined, structured, specific movement task be set for the whole group and b) that within the framework of this task the children must find their own individual solutions and answers in terms of movement. Initially the movement tasks are simple, limited and demand only little inventiveness, simple coordination, and few combinations. Gradually the tasks become more complicated and demand higher degrees of inventiveness, understanding, co-ordination and also demand the combination of more elements.

The concept of size, for example, is used as part of the concept of "opposites", and also as a preliminary stage in the development of the concept of gradation and of relativity in size. The various aspects of size such as length, distance, height, area, volume, size of objects, extent of movement, size of groups, and quantities, are all dealt with. So are the one-, two-, or three-dimensional variables and numerical variables. It is necessary, therefore, to construct movement tasks to represent the various aspects of the concept of size.

Following are examples of activities employed in working on different aspects of size.

Aspects to be taught	Instructions for activity
Length	Walk with very small steps, walk with very big steps. Take eight very small steps followed by eight very big steps.
Height	Jump up high; jump so lightly that you barely leave the ground.
Distance, range of movement	Clap, keeping your hands very close together. Clap, spreading your hands wide apart.
Height	Put your hands very close to the floor. Put your hands way up, as far from the floor as you can.

Concept to be taught	Instructions for activity
Quantity	Group work: Arrange yourselves into small groups. Now arrange yourselves into one very big group.
Quantity and volume	Arrange yourselves into small groups that take up very little space. Arrange yourselves into small groups that take up as much space as possible. Arrange yourselves into a big group that takes up as much space as possible. Arrange yourselves into a big group that takes up as little space as possible. The teacher can have part of the group perform while the other children observe, analyse and compare.

The concept of gradation in size is much more difficult than the simple distinction between big and small; thus this distinction forms the basis for the development of the concept. The activities described above can form the basis for working on gradation.

It is necessary to start with sizes with large differences between them, and only gradually to arrive at distinguishing between small differences. In this way the children become sensitive to such small differences, and are able to describe them in movement.

Size may change smoothly and continously ('legato'), or in abrupt, discontinuous steps ('staccato'); there are varying degrees of abruptness and smoothness of change. It is necessary to include movement tasks representing these two modes of change. The growth of a plant and the rising of boiling milk in a pot are examples of a smooth, continuous change in size. A series of jumps with gradually increasing height or distance is an example of abrupt, sharply discontinuous change. Arranging groups of children with an increasing number of children in each group is an example of a truly discontinuous increase.

Gradation in size can be seen in a single object, such as a balloon being inflated, a house being built, milk boiling over in a pot, or in a series of objects which gradually differ in size. In the first case, there is a dynamic change of size in time, while in the second case, the gradation is static.

Gradation in size may sometimes be reversible, may operate in both directions, e.g. a balloon may be inflated and then deflated, and a series of objects gradually changing in size may be approached from both ends. Here size will increase in one direction and decrease when approached from the opposite direction.* On the other hand, some natural phenomena of gradual changes in size are irreversible, such as the growth of a plant or of a child.

The concepts of big and small and of gradation of size can be developed in many different ways, demanding fine differentiation of size, exactness in gradation, combinations in individual performance and in group performance. It should be added that concepts are taught through abstract movement, movement games, and themes both real and imaginary, such as: balloons (gradation of size, volume, roundness, continuous, flowing change); climbing ladders (gradation of size in discontinuous change); trains (increase and decrease in quantities - number of wagons); growth of a plant (height and volume, continuous growth) growth of a city - children making shapes of buildings with their bodies (quantities, volume).

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* Example of activity: 5 children are asked to stand in a line. The child at one end of the line is asked to make himself as big as he can, and the child at the other end of the line is asked to make himself as small as he can. The other three children have to adjust the form and size of their bodies so that the whole group forms a gradually increasing line of sizes. Then we reverse the direction of increase of size. We help the children to observe and understand that increase in one direction is decrease in the reverse direction.

PART THREE: DESCRIPTION OF THE RESEARCH

1. The Aims of the Research

Investigators note that the difficulties of disadvantaged children with intellectual functioning arise from defects in their thought processes and from the paucity of contents and concepts at their command. They stress the interdependence of these two problems. In order to rehabilitate and develop the intellectual ability of culturally disadvantaged children, it is necessary to build concepts and impart knowledge. Such basic knowledge is indispensable to any development of intellectual ability (1,3). The research aims are, therefore, divided into two categories:

A) General and broad aims: development of characteristics considered important for intellectual functioning.

B) Specific and immediate aims: promoting the development of basic concepts.

A) General and Broad Aims: Development of Characteristics Considered Important for Intellectual Functioning

Our work in movement enabled us to emphasize several of the characteristics of intellectual functioning dealt with in the theoretical introduction. We regard the development of these characteristics as the general and broad aim of the research.

i. Ability to verbalize and conceptualize: Movement is given appropriate and precise verbal expression. Movement and movement representations are translated into concepts which are the abstract symbols of concrete phenomena.

ii. Observation and differentiation: The method directs the child to observe the movement of others in order to distinguish essential movement characteristics.

iii. Ability to abstract: We aim at promoting the ability to regard movement elements and their conceptual parallels not as separate and incidental elements within the world of movement, but rather as basic concepts by which phenomena in the child's experience and environment are analyzed, compared, and generalized.

iv. Increasing attention and concentration: The child's attention and concentration span is gradually lengthened, as is his ability to concentrate on a given task without being diverted by external stimuli.

v. Development of mental flexibility: We aimed at developing flexibility in performance of the movement tasks, in conceptualization, in development of thought processes, and in social functioning.

vi. Multi-dimensional co-ordination: We tried to develop the child's ability to perform several activities at the same time, and to c-ordinate them both theoretically and mentally.*

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* Multi-dimensional co-ordination is the ability to combine movements of different parts of the body in order to perform several complicated motor tasks at the same time. Kohen-Raz (35,2) calls this "performance of parallel sinergic movements." The ability to perform parallel movements is mentioned in the literature as one of the highest motor functions. Kohen-Raz says that since simple motor movements form a basis for the development of various perceptual processes, it can be assumed that the increasing internalization of the complicated sinergic movements is a condition necessary for the growth of cognitive processes on a higher level. Piaget also stresses the importance of multi-dimensional co-ordination in the development of concrete operational thought.

vii. Restraining impulsiveness and increasing self-control: These are to be developed in movement, in the ability to act in co-ordination with others, and in the ability to withstand internal and external diversions.

viii. Development of self-expression: We include here the discovery of individual solutions to movement tasks as a basis for the development of creativity, together with the ability to arrive at various correct solutions, and to make use of an extensive and rich "movement vocabulary".

ix. Development of Spatial Orientation: We aim at the development of flexibility in spatial and directional orientation, in the use of a given space and in the ability to function in different group structures.*

x. Co-ordination with another person and functioning in a group: The child should be able to move with a partner and to co-ordinate his movements with him, within the framework of a given task.

xi. Body awareness: The child should be made aware of the different parts of his body, and what he is able to do with them in movement. He should be able to consciously activate them and to solve movement tasks, either by using the body as a whole or by using the different parts separately.

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* Investigators note the connection between spatial orientation development and the development of thought processes. For example, Hebb (26) notes the importance of motor processes such as approach and retreat, touching and grasping with the arm, fingers and hands, as a basis for form, shape and space perception. Piaget notes that the manipulation of objects in space and movement of self in space, serves as a basis for the formation of directional and spatial concepts and the formation of internalized spatial orientation.

B) Immediate and Specific Aims: Promoting the Development of Basic Concepts

The fundamental concepts of form, size, space, quantity, time and force, are basic to all thought processes. They are important in the pre-school kindergarten and imperative for school readiness. From these concepts we have chosen those that can be dealt with in movement. The contents of lessons dealing with concept formation were chosen, adapted and planned on the basis of the research and kindergarten programs of S. Gray (22,20), G. Painter (46), Weikart et al. (61,62), Bereiter-Engelman (15), Early School Admission Program (19), Hainsworth (23) and the Jerusalem District Kindergarten Inspectorate (8). All these programs include essentially the same basic concepts. For a detailed list of the concepts in these programs, see Appendix 2.

2. Description of the Research

A) Background Data on the Research Population

Two state kindergartens in the Shemuel HaNavi neighborhood of Jerusalem were chosen. This is a lower-class neighborhood, crowded, neglected and populated with large families. The kindergartens were located in the center of the neighborhood and suffered from severe disturbances by older children who did not attend school and who disrupted the normal course of study. Intellectually, and socially, the population of these kindergartens was considered one of the most difficult in Jerusalem. The kindergarten teachers were familiar with the neighborhood and maintained contact with the families. They noted the special difficulties which confronted them in their work in the neighborhood and in the kindergartens. The supervisor

and the teachers gladly accepted our request to conduct research in the kindergartens and co-operated with us throughout the course of the project. They were not, however, informed of the details of the research and work with the children, in order to prevent them from employing the experimental methods in their daily work even subconsciously and unintentionally. This would disrupt the research design and prevent evaluation of the specific influence of our work.

The kindergartens were using the regular kindergarten syllabus, which strongly emphasizes the development of intellectual processes in general, and the teaching of specific concepts in particular. In other words, throughout the year, the kindergarten teachers worked with the children on concepts, parallel to those of our research. No physical education, rhythmics or music lessons were given in the kindergartens within the regular framework of study.

Children from Jerusalem's Bayit Vegan neighborhood were also included in this research. Bayit Vegan is a relatively new neighborhood, with a population consisting mainly of professionals of European origin. The children were chosen from three kindergartens who came under the same educational supervision as the Shemuel HaNavi kindergartens and who were working with similar syllabi.

B) Research Groups

The children participating in the research were pre-school kindergarten children aged five to six - 62 culturally disadvantaged children from the Shemuel HaNavi neighborhood and 24 middle class children from the Bayit Vegan neighborhood. The characteristics of the culturally disadvantaged are presented in Table 1.

The middle class group was added to the research as a comparison group. This gave us a criterion of "normal" functioning and development. By "normal" children,

TABLE 1. Characteristics of the Culturally Disadvantaged Children

NUMBER OF CHILDREN	ORIGIN	NUMBER OF CHILDREN IN FAMILY	FATHER'S OCCUPATION
26 boys	Oriental - 70%	1-3 children in 31% of the families	39% laborers and skilled laborers
36 girls	Israeli - 26%	4-5 children in 35% of the families	22% craftsmen
	Eastern European - 4%	6-9 children in 23% of the families	39% services
		10-13 children in 11% of the families	
62	100%	100%	100%

we mean middle-class children of average intelligence. We therefore chose from the population of the three middle-class kindergartens those children whose parents' education did not go beyond high school or teacher's seminar, and who had no less than an elementary school education. 24 children were chosen from the three kindergartens. Their characteristics are presented in Table 2.

TABLE 2. Characteristics of the Middle Class Group

NUMBER OF CHILDREN	ORIGIN	FATHER'S OCCUPATION
15 boys	Oriental - 4%	12% skilled laborers
9 girls	Israeli - 50%	13% craftsmen
	European - 16%	12% services
	Unknown - 30%	38% clerks
		25% teachers
24	100%	100%

C) Treatments in Experimental and Control Groups

The culturally disadvantaged experimental groups received three half-hour creative movement lessons every week. These were conducted by a professional expert in this field. The movement lessons had two aims: to promote the development of specific concepts and to develop characteristics considered important in intellectual functioning (see "Research Aims", pages 36-39). For a detailed description of the working method, see Part Two (pages 22-36). The culturally disadvantaged control groups were instructed, at the same time, by a different teacher, in free and non-directed motor activity, such as ball games, free running, relay races, etc.

D) Evaluation Measures

1. Tests

A battery of psychological and psychometric tests was constructed to give a quantitative evaluation of the effect of treatment, within the three main research areas:

I - Level of functioning

II - Learning and internalization of the basic concepts

III - Maturity and readiness for school

Standard clinical and research tests were included along with tests especially designed for our research purposes. The latter are performance tests. In this way, the "distortion" created by verbal testing of culturally disadvantaged children is prevented, but a measure of the degree of concept internalization in a non-movement medium is still possible.

The tests in detail:

I - Level of functioning

a. The WPPSI Test was chosen as a measure of general intelligence.

b. The Bender Gestalt Test (36) was included in the test battery because it is recognized as an excellent index for the evaluation of visual-motor development and maturation and can predict future learning achievements, It also serves the specific aims of evaluating the quality of form perception (36). For this reason, it is useful not only for determining the level of performance, but also for studying internalization of the specific concepts, and maturity and readiness for school. We were unable to grade the test on the Kopitz Scale because the performances of the culturally disadvantaged children fell below the level measurable by this scale. It was also apparent that the Kopitz Scale would show only slight differentiation among the children, and was therefore unsuitable for the aims of the research. It was thus decided to construct a modified and refined version of the Kopitz Scale.

II - Learning and internalization of the basic concepts

The tests for measuring the ability to discriminate forms, ability to discriminate directions, spatial orientation (Tests B,C,D) and the first part of the Size Concepts Test (Test A), were constructed for the purposes of this research but were not examined for reliability and validity.

a. Size concepts - seriation test: This was a two-part test. The concrete part employed toys and the abstract part employed abstract forms drawn on cards. The latter were taken from the Leiter non-verbal intelligence test.

b. Form Discrimination Test

c. Direction Discrimination Test

d. Spatial Relationships Test

e. Concept Conservation Test: These concepts were tested by the Goldschmid-Bentler Test, based on Piagetian theory (21).

III - Measurement of maturity and readiness for school

a. Minkovich's Arithmetic Readiness Test (4), was designed especially to test school readiness and is based upon present-day theories of thinking.

b. Bender Gestalt Test (see above, page 43).

All tests were given at the beginning and end of the research period, except for the WPPSI and Arithmetic Readiness Tests. The WPPSI was given only at the beginning because it is unlikely that the specific treatment that was given had any influence on I.Q. The Arithmetic Readiness Test is meant for children entering school and was therefore more appropriately administered at the end of the research period.

2. Observations

Throughout the research period, every movement lesson of the disadvantaged experimental group was recorded by two observers. The observations served as the main basis for qualitative analysis of: a) the medium of movement, b) content analysis of the lessons, c) analysis of specific problems of culturally disadvantaged children in this kind of work, d) the degree to which the broad and the specific aims of the research had been achieved.

E) The Course of the Research

The entire test battery (except for the Arithmetic Readiness Test; see "Evaluation Measures", pp. 42-44), was given to the entire research sample (62 culturally disadvantaged children and 24 middle class children), at a preliminary stage. Testing

was conducted by experienced examiners, was individual, and consisted of three meetings with each child. The tests were presented in the same order to all the children and every child was examined by one examiner only.

The children of the two disadvantaged kindergartens were divided into two groups, matched for intelligence, sex, and age (Table 3).

Table No. 3

Background Data on Research Groups

	Total Number of Children	SEX		Average Starting Age	Mean Scores on WPPSI Test		
		MALE	FEMALE		Verbal	Performance	Total
Experimental Group Culturally Disadvantaged	31	12	19	5.41	89.35	91.61	89.45
Control Group Culturally Disadvantaged	31	14	17	5.47	91.07	89.03	89.26
Middle Class Group	24	15	9	5.40	110.70	115.87	114.22

Four groups of culturally disadvantaged children were thus formed, two experimental and two control. In the statistical analysis of the tests, however, the two experimental and the two control groups were each considered as one.

After dividing the groups, the treatment period began. The two experimental

groups in the disadvantaged kindergartens received three half-hour movement lessons each week. At the same time, the control groups in these kindergartens received free-motor-activity lessons (see "Treatments in Experimental and Control Groups", p. 42). This was done in order to counteract the "Hawthorne Effect" in the experimental groups, and to compare the disadvantaged experimental and control groups on an additional variable. Thus, all the groups in the disadvantaged kindergartens received motor activity lessons for the same length of time. The middle-class comparison group received no treatment.

At the end of the six month research period, the same battery of tests was again administered, without the WPPSI and with the addition of the Arithmetic Readiness Test (see "Evaluation Measures", p. 42 - 44), to all the groups (control and experimental, disadvantaged and middle class) by the same examiners. The only difference was that the examiners did not test the same children they had tested before. The tests were graded by one examiner, except for the WPPSI and Bender, which were graded by an expert.

3. Results of the Research

A) Development of Characteristics Considered Important for Intellectual Functioning (Broad Aims), on the Basis of Observations and Impressions.

The children's progress with regard to these aims was evaluated on the basis of impressions from detailed observations of each lesson. For several reasons it was impossible to arrive at a quantitative evaluation of this progress. We did not find tests in the afore-mentioned fields which suited our research population. Several tests were tried in an attempt to measure flexibility of thought, ability

to work in teams and body awareness, but they were not found to be suitable to the research. The directions of progress which we will discuss were observed in movement lessons. Some were expressed through motor activity, with no examination of "transfer" to non-motor situations. It is possible that a more prolonged and intense treatment period may have a stronger effect, and will produce evidence of "transfer" to various other areas. The initial general level of the experimental population was very low, and this was expressed in all the areas we attempted to develop. For this reason, we considered even the smallest progress an achievement.

In this context, we would like to mention several points pertaining to qualitative progress in concept formation (specific aims). Most of the children revealed an extremely low initial level in knowledge of the basic concepts of quantity, space, opposites, shape, size and time. This low conceptual level was revealed in a lack of terminology, blurring and confusion of concepts, lack of discrimination between differences and lack of any methodical organization of the different concepts. The present description of movement work with disadvantaged children has importance beyond the scope of this research.

(1) Ability to Verbalize and Conceptualize:

From the beginning, the children revealed a total inability to express verbally what they performed in movement. If there was any verbalization, it was imprecise, poor, non-informative and ad hoc, e.g.: "I do like this with my hand". We noticed that the level of movement performance was much higher than the level of verbal performance. In our work we constantly emphasized verbal mediation between movement and concept, and after approximately 20 lessons, we

noticed an improvement in the ability to apply relevant and precise verbal expression to movement, and in the ability to perform correctly according to verbal instructions. The children became accustomed to the connection between movement and concept, and they eventually were able to verbalize what they were doing, spontaneously and independently.

(2) Ability to Abstract:

From the start the children perceived the movement tasks as random and isolated activities, without an awareness of the connection between them. Later, we heard such remarks as "Here we are being small and big in the group, like we were doing in steps" or "Small is the opposite of big, just like far is the opposite of near". The ability to discuss phenomena in regard to their movement characteristics was also developed with the help of the teacher, e.g. in a bouncing ball, the following elements were observed: direction, speed, shape and height. The following was seen in a balloon being inflated: gradual changes in size, changes in shape, and the reversibility of inflating and shrinking.

(3) Observation and Discrimination:

In every lesson, time was allotted to tasks which were meant to sharpen observation and discrimination abilities. In movement imitation games, for example, the observation was at first very diffuse and superficial. With time, through exercise and guidance, observation and discrimination improved and the children learned to observe small differences and to prolong their observation periods. This improvement was also expressed in the ability to describe and evaluate the movement performance of others. The teacher, however, still had

to guide the observation, to focus it and to persist in her assistance.

(4) Attention and Concentration:

While working with the children, we noticed two phenomena related to concentration and attention: great fluctuation in level of attention and concentration from lesson to lesson, and great dependence on external diversions. In most of the other characteristics we have discussed in this chapter, we noticed, throughout the research, a slow but more or less constant development. With regard to attention and concentration, however, we were surprised by the fluctuations from lesson to lesson. It was often possible to explain them by factors external to the framework of the experiment, e.g. the weather, the kindergarten teacher's illness, absences, or an unusual event in the kindergarten, but sometimes no detectable interference was evident. Of course, the blame occasionally lay in a teaching method unsuitable to disadvantaged children which failed to arouse their interest. It was necessary to constantly evaluate our teaching methods for motivation, difficulty, variety, and connection with the children's previous knowledge. Another reason for instability of concentration and attention lies in the fact that culturally disadvantaged children are easily diverted by external and irrelevant stimuli. Any slight noise outside, any social diversion, any irrelevant internal association meant loss of attention and concentration. Obviously, these fluctuations always affected performance level and understanding.

Attention and concentration during our lessons eventually improve, in as much as this depended on becoming accustomed to the teacher, to the method and to the activity. In the beginning, the children could not concentrate on any activity

for more than 15 minutes but this grew to a range of 20-25 minutes.

(5) Development of Flexibility and Elimination of Rigidity:

From the beginning, inflexibility was apparent in the children's movements, thought processes and social functioning. This rigidity was expressed on different levels. On the operative level, the most basic level, the children reacted chaotically to every change in the lesson procedure, such as seating order, opening greetings, musical accompaniment, etc. Every change of this sort caused confusion, and loss of interest and involvement. Difficulty in moving from activity to activity and from role to role was also apparent. For example, in situations which called for partners and in which one was active and one passive, the children had difficulty in changing from the passive to the active role in the same situation. It was also difficult for them to change from one group formation to another, from a circle to a line, from having partners to a free arrangement. The transition in itself was difficult, and continuing the same movement activity in a new group structure was even more difficult. This is a difficulty on a different level, and we will discuss it later. We noticed a constant and continuous improvement in all problem areas on the operative level, and with time most of the children succeeded in transitions and changes of this kind.

Inflexibility was expressed on a deeper level when the child was requested to perform a familiar task in a set-up different from that in which he first learned the task. For example, the directions "forward and backwards" were first learned when the children were scattered freely about the room, and it was quite obvious that the children understood and knew the directions. But when

forwards and backwards were presented while the children were arranged in a circle, they became confused and could not perform correctly. In another example, spatial directions were first taught when the children were scattered about the room, facing a wall along which stood a piano, so that "forward" was in the direction of the piano. When they were requested to perform a task in those directions, but facing a different front, they became confused. Although "forward" was no longer towards the piano, that is, walking towards the piano was now in the direction of "sideways", the children performed "forward" towards the piano and not towards the new and correct "forward". This is a typical example of inflexibility, i.e. of the inability to free oneself from a set, together with what Frankenstein calls externalization.

Also the children were unable to "transfer" a concept from one context to another. Another instance of difficulty appeared when the children were requested to define a single situation from different points of view, e.g. "The child is on the building block. Where is the building block?"

We noticed an improvement from approximately the twentieth lesson on. At least in the movement lessons, that is in the two-way activity of movement and conceptualization, it seemed that rigidity was reduced and that the ability for mental flexibility had somewhat developed.

(6) Multi-Dimensional Co-ordination:

From the beginning, the children found it very difficult to perform several different activities simultaneously. That is, activities that demanded multi-dimensional co-ordination in their motor components were difficult. For instance walking and clapping hands at the same time. Activities which call for

multi-dimensional co-ordination in their conceptual content, such as drawing circles in the air which gradually grow bigger and smaller, or walking forward on a high level and backwards on a low one were very difficult.

From about the twentieth lesson on, a certain improvement was noticed in multi-dimensional co-ordination, and it became possible to present tasks demanding such co-ordination, as long as they were on an easy to moderate level of complexity. It is obvious that this improvement was closely connected to the improvement in attention and concentration, as well as in flexibility and self control. This last component will be discussed below.

(7) Controlling Impulsiveness and Increasing Self Control:

At the very beginning of our work, we were impressed with the great need of the children for motor activity. They ran around in the yard and garden whenever they were allowed to do so. Free games in the schoolyard were actually a constant chaos of running, jumping and wrestling. This need for movement was immediately apparent in the movement lessons. From the beginning, the children found it very difficult to control themselves and to direct their motor activity towards a certain aim, i.e. to perform in accordance with objectives and instructions. When they were requested to control the impulse to move, they usually reacted with either frenzy or passive immobility. Throughout the research period, an improvement was noticed in control of such impulsiveness and in the ability to direct movement towards a given task. This enabled us to work toward the basic research aims. In addition to this initial control improvement in specific areas of movement control was also observed. In the beginning, it was apparent that the children had great difficulty in performing

slow, small and light movements and that they preferred fast, forceful and large movements. In addition, when the movement task requested fast, forceful or large movements, it seemed that these movements overcame both the child and the task, and the children tended to follow the movement impulse uncontrolledly. Improvement in both kinds of control was observed later on, together with an improvement in the ability to isolate parts of the body in movement.

Until now we have discussed self control in the area of movement only. Initial difficulty and later improvement were observed in other areas as well. They were seen, for example, in the free use of space, that is, in the ability to move without a fixed group formation such as a circle, a line, or a row (which in themselves demand control), to move freely in space without colliding with others and with maximum use of the given space. This calls for internal self control. There was also improved ability in co-ordinating movement in a group or with a partner, in overcoming the impulse to compete with the partner, to hurt him or to bother him, along with the ability not to be satisfied with a social interaction in itself, but to direct the interaction towards solving a given task. Prolonged concentration and increased attention should also be regarded, at least in part, as a function of increased self control and restraint. Finally, we recognized an improvement in self control and restraint. The children learned to think and plan their movement activity in such a way that it would truly answer the demands of the movement tasks, and would do so using the relevant concepts. This stands in contrast to the initial movement reaction which was free, spontaneous and totally associative.

It is important to emphasize that the daily routine in the kindergarten was organized fairly rigidly, and it seemed obvious that it was difficult for children to conform to the demand for self control, especially when the movement activity of our lessons gave them relative freedom and flexibility.

(8) Self Expression and Discovery of Personal Solutions as a Basis for Development of Creativity:

From the beginning, most of the children tended to imitate the movements of a few "leaders". These "leaders" were either socially accepted children or else children who had performed particularly well, revealing ability and ingenuity in movement. When the children were not imitating their outstanding friends, they tended to move stereotypically, using limited "movement vocabulary" in the solution of the different tasks, and repeating the same movements over and over again.

The low level of functioning typical to culturally disadvantaged children was also evident in movement lessons. The children revealed a great desire to move and be active, but in the beginning at least, they reacted on a purely motor level. They were unable to endow their movements with content, expression, or organization. This may have been due in part to a low level of body awareness, an issue which we will discuss below. We concluded that work in movement with this specific group of culturally disadvantaged children should be regarded as pre-creative. In the initial stage it was necessary to present very easy and well defined tasks. Very often it was necessary to demonstrate the solutions, in order to ensure that the children begin with the correct solutions, and to provide them with basic movement material

they could then begin to develop themselves further. In other words, it was initially necessary to broaden their "movement vocabulary" through direct demonstration and imitation. Although the beginnings of inventive movements were observed from approximately the twentieth lesson on, and although the children began to introduce some personal expression in their movements, these still remained very limited by the set tasks. It was not yet possible to claim that there was real creativity; the variations and individual expressions were still modest and simple in content.

(9) Space Orientation:

At the beginning, the children found difficulty in using space freely. They tended to crowd into groups in given places and to collide with one another. They performed better in simple and familiar group formations such as in a row or a circle, than when given the chance to move freely around the room. In time, however, improvement was noted in their ability to move from one group formation to another and to function in free and non-rigid group formations. We saw these improvements, among other things, as a function of improved spatial orientation. It was obvious that the actual work on spatial concepts, such as directions, shapes, spatial relations and group formations, contributed to the improvement of spatial orientation.

(10) Co-ordination with Others and Performance within a Group:

At the beginning, the children had great difficulty in functioning together with others. Tasks that had to be performed with partners caused chaos.

The children squabbled, ran around, and changed partners constantly. The first improvement occurred after ten lessons when they began to perform with a partner with greater co-ordination and understanding. At this stage, the squabbles, running around and exchanges did indeed decrease. The social interest, however, overcame the movement interest, so that the movement task became secondary to the social relationship. At a later stage, the children began to work well in co-ordination with a partner and at the same time to concentrate on solving the movement task. When we increased the number of children in a group to three, four, or more, difficulties in co-ordination reappeared. It seemed to us that two, or three at the most, was the maximum number of participants for a group which could function well together and concentrate on the task.

As to working in large groups, it was easier to work in group formations of lines and rows, where every child had only one neighbour on either side, than in a circle where the social interaction was inherently stronger. Here we are not discussing team work in which co-ordination is required for solving the task, but a group formation, in which every individual performs independently. We did not note any real improvement in team work. In cases where co-ordination and the combined effort of individuals toward the solution of one task was necessary, it was very apparent that the children could not perform successfully. Clearly the ability to perform together with others is connected to the control of impulsiveness, to self control, and to attention and concentration ability.

(11) Body Awareness:

From the beginning, there were apparent difficulties in using the body. This seemed to us to stem from an undeveloped body awareness and a hazy body image, together with defective self control and lack of concentration ability. At first the children could not name the body parts, and even after they had learned them, they still had difficulties in activating them when and as requested. That is, they had difficulty both in isolating parts of the body in movement, and in moving the whole body when this was necessary for the execution of a task. There was rapid improvement in this area during the course of our work.

The children were unable to perceive the maximal range of their bodies in terms of size, width, height, etc. They also tended to use their bodies in a two-dimensional rather than three-dimensional way; that is, they had difficulty with forms and positions showing volume. They had difficulty in maintaining a given position or body shape for any length of time. In addition, they tended to use the parts of the body symmetrically, and very little asymmetrical use of the body was observed.

Perception of the body's ability to move, three-dimensional and asymmetrical use of the body are connected with well-developed body awareness and image. Extensive exercises, corrections, observations and analyses were necessary to develop such awareness. We sometimes had to use practical correction before verbal instruction. That is, we had to "set" the child's body, move and organize the parts of his body with regard to posture, shape, direction, etc, before going on with exercises and learning. It should be noted that since

all our work involved motor activity, any learning, progress or improvement with regard to the objectives we set would have had to cause improved body awareness, because the body was the primary means of learning.

We conclude this chapter with several general remarks:

(1) During the entire research period we noted again and again that children of kindergarten age, and especially culturally disadvantaged children, tend toward movement activity. The children were kept active and involved by the medium.

(2) We were impressed by the fact that, when the program first began, the particular group of culturally disadvantaged children with whom we dealt were functioning on a very low level, especially when compared to their middle-class peers, and even in comparison to disadvantaged children from other neighbourhoods. We were also impressed by their relatively slower rate of progress, an impression gained from observations done within the framework of the present research, and from long previous experience in work with children of various ages and backgrounds.

(3) In spite of the children's initially low level of functioning, progress was noted in many areas of work. In fact, when the initial level is so low any progress is regarded as success. It was our impression that the greatest amount of progress was in verbal and conceptual ability, in the ability to abstract, observe and discriminate, in spatial orientation, co-ordination with partners and body awareness. Moderate progress was observed in increasing attention and concentration span, controlling impulsiveness and increasing self control, developing flexibility and eliminating rigidity, and in the ability for multi-dimensional co-ordination. Very slight progress was observed in creative

ability, team work, and co-ordination of larger groups.

(4) Even when the children were progressing and executed their tasks well they needed constant direction, encouragement, assistance, guidance, and especially control and restraint.

(5) Progress in the areas we have mentioned was expressed both through the movement performance as well as in non-movement functions. This can be regarded as "transfer" of the treatment effect from movement to broader areas. Two questions must be asked, however, which could not be answered in the framework of the present research:

a) Is the observed effect durable and will it persist after treatment has stopped?

b) Can it be observed in the children's functioning outside of the framework of movement lessons?

In asking these questions we must remember that the treatment was administered over a short period of time.

(B) Test Results in the Area of Concept Formation* - Results and Discussion.

We shall expand our discussion beyond the findings of the present research and deal with the type and level of functioning of culturally disadvantaged children as compared with middle-class children, as well as with the development which took place in these children during the research period. Such an expansion is important not only in and of itself but also because it will allow us to look at the research results against the background of "natural developmental

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*The averages of all the tests are given in Appendix No. 1 in concise form (pre-treatment, post-treatment and rates of progress).

processes" of these children. The discussion, therefore, will deal with the following:

(1) The performance level of disadvantaged children as compared to that of middle class children (experimental and control groups of culturally disadvantaged versus the middle class group).

(2) "Natural" development of culturally disadvantaged children versus that of middle class children (disadvantaged control group versus middle class group).

(3) The effects of treatment as related to the following questions:

a) Did the culturally disadvantaged experimental group progress further than the culturally disadvantaged control group?

b) Was school readiness affected by the treatment?

(1) Level of Performance:

Intellectual Ability (WPPSI)

Table No. 4

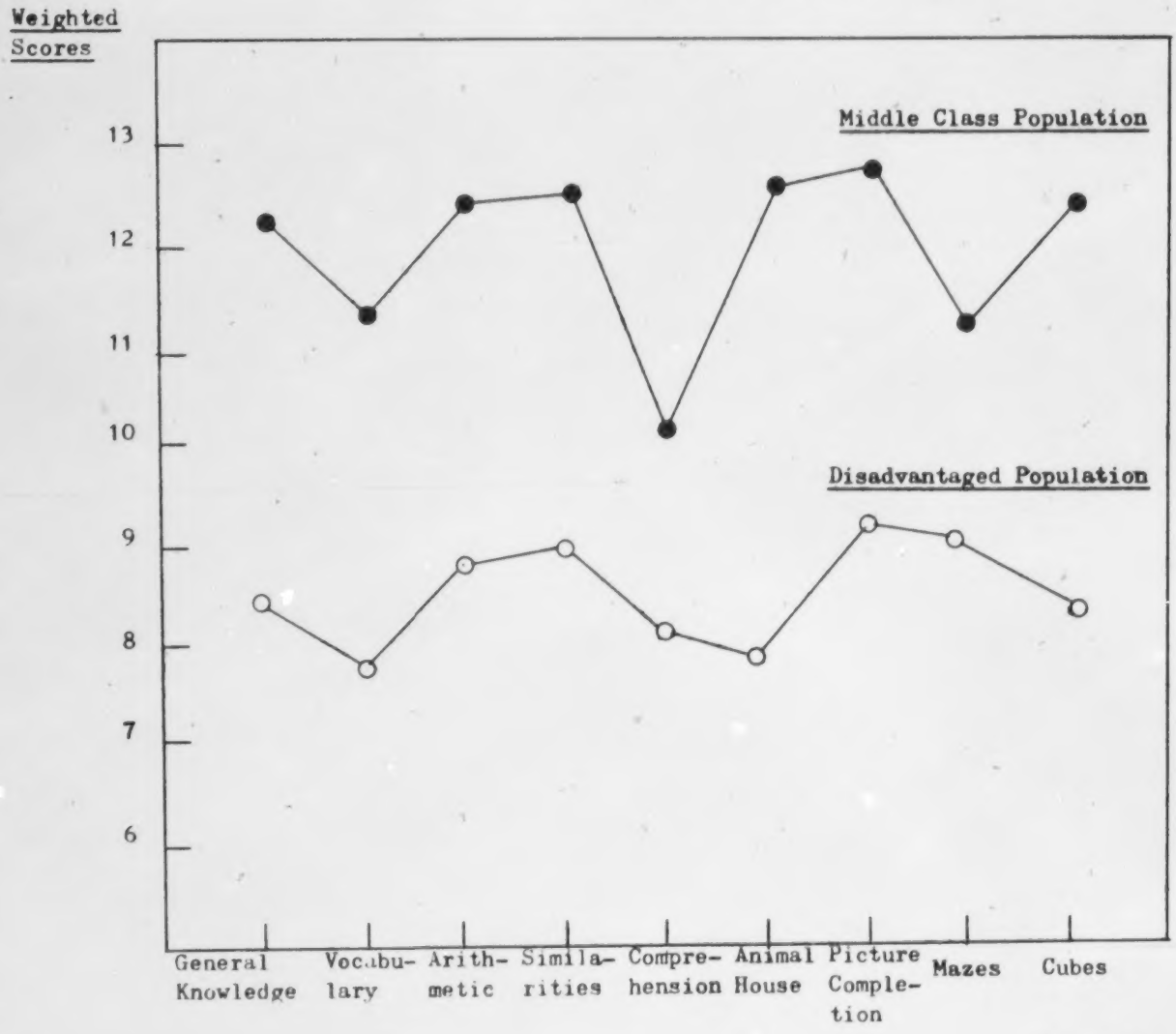
Mean Intelligence Level According to the WPPSI Test

Tested Function	Culturally Disadvantaged Population N = 62	Middle Class Population N = 24
General Knowledge	8.38	12.20
Vocabulary	7.81	11.30
Arithmetic	8.84	12.43
Similarities	8.92	12.52
Comprehension	8.03	10.09
Animal-House	7.89	12.65
Picture Completion	9.19	12.78
Mazes	8.98	11.26
Cubes	8.44	12.39
Verbal I.Q.	90.08	110.70
Performance I.Q.	90.35	115.87
Total I.Q.	89.30	114.22
All differences are significant (t-test, $p < .05$)		

As expected, the two populations were indeed different in level of intelligence as measured by the WPPSI, but the average of both groups fell within the range of the normal (Table 4). The profile of performance characteristics reveals a surprising similarity between the two groups (Figure 1), that is, the groups did not differ in basic structure of intellectual ability. This is in line with recent findings as reported in the literature (39).

Figure No. 1

Profile of WPPSI Mean Scores



Initial Level of Maturity (Bender Gestalt Test)

The Bender Gestalt Test is an indirect measure of intellectual ability as measured by the level of visual perception and grapho-motor ability. This is additional to its clinical use as a diagnostic tool for brain injuries and functional mental disturbances. Assessment of visual perception and grapho-motor ability can be used as a reliable measure of developmental level because these two aspects of the intellectual ability develop gradually but at a recognizable rate, especially in early childhood.*

The mean scores of the disadvantaged population in the Bender-Gestalt test were significantly lower than the scores of the middle-class population, and their grade range was wider (Table No. 5).

In light of these differences in the performance levels of both populations, it is not surprising that the middle-class surpassed the disadvantaged group on all measures of conceptual ability with which this research dealt (Table No. 5).

Table No 5

Means of Specific Tests - Initial Level.

		Culturally Disadvantaged Population N = 62	Middle Class Population N = 24	Significance of the Difference 1)
Bender Gestalt		29.94	41.13	*
Discrimination of Form	+	10.61	11.21	
	-	9.90	4.17	*
	Total	0.70	7.04	*
Discrimination of Directions	+	7.68	7.25	
	-	18.00	5.58	*
	Total	-10.32	1.67	*
Spatial Relationships	a	9.16	11.92	*
	b	5.57	7.08	*
	Total	14.73	19.00	*
Series Test:	"Toys"	69.95	88.35	*
	"Leiter"	44.57	62.83	*
	Total	114.29	151.17	*
Goldschmid-Bentler Test	Behavior	0.73	1.77	*
	Explanation	0.11	1.23	*
	Total	0.84	3.00	*

1) $p < .05$ *(t - test)

The test was graded on a new scale (see page 43).

(2) "Natural" Development:

This research was not designed to deal with developmental issues, but since we are interested in understanding the greater gains of the disadvantaged experimental group it is necessary to relate to the rate and amount of progress that took place in the two groups that did not receive experimental treatment. That is to say, to relate to "natural" development*, in both research populations. Although the entire experimental period lasted only half a year, it is known that rate of development in early childhood is very rapid, and it is therefore possible to study development even within such a relatively short time span. A difficulty of developmental analysis is that developmental scales are based on assumptions of linear growth, but examination of this assumption is definitely beyond the scope of this research.

Table No. 6.

"Natural" Development - Culturally Disadvantaged vs. Middle Class
Mean Rates of Progress Between "Pre" and "Post"

		Culturally Disadvantaged Control Group N = 31 [1]	Middle Class Group N = 24 [1]	Significance of the Difference [2]
Bender Test	Total Grade	4.37*	2.71	
Discrimination of Forms	+	0.53	0.17	
	-	4.03*	1.79*	
	Total	4.57*	1.96*	
Discrimination of Directions	+	-0.29	0.00	
	-	9.97*	3.50*	*
	Total	9.68*	3.50*	*
Spatial Relationships	a	0.42	0.88	
	b	-0.30	0.71	
	Total	0.23	0.17	
Series Test	"Toys"	11.16*	3.42	
	"Leiter"	12.19*	7.80	
	Total	23.87*	11.22*	
Goldschmid-Bentler Test	Behavior	1.23*	1.00	
	Explanation	1.00*	0.73	
	Total	2.29*	1.83	

*p < .05 (t-test)

1) Significance stars near the numbers relate to the significance of the difference "pre" and "post" in the same group.

2) Significance stars relate to the gap in differences between the two groups.

* "Natural" development - those changes that took place in kindergarten children with no experimental intervention.

In order to discuss "natural" development in the disadvantaged experimental population, we must first relate to the development rate of the disadvantaged controls, and only afterwards compare it to that of the middle class group. The findings (see Table 6) revealed that, over the half-year period, significant improvement did indeed occur in the disadvantaged control group on most of the variables measured. A significant improvement on the Bender test is clearly seen at the end of the research period* , and significant differences were also found in analyzing the other tests. Significant progress of the disadvantaged groups was seen on all the measures, except those of space orientation. Significant improvement took place in the middle class group on measures of form discrimination and directional discrimination, and more moderate progress was seen on the Series Test. On all tests, the disadvantaged control group progressed more systematically than did the middle class group, although not significantly so. The resulting impression is that the disadvantaged children showed greater development than did the middle class children.

The high scores of the middle class group on the form, directions and series tests seem to indicate the presence of a "ceiling effect" almost positively, so that a full picture of their progress was not obtained. However, a different explanation must be found for the greater gains of the culturally disadvantaged control group over the middle class group on the Bender, Bentler and Spatial Relationships Tests, for which no "ceiling effect" was found. It is possible that entrance into kindergarten serves as a new stimulating and "learning" experience for disadvantaged children, and has a greater effect on them than on middle class children who have much similar stimulation at home.

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* The WPPSI Test was not repeated at the end of the research period.

We should remember however that a considerable gap between both populations on all the indices still remains, in spite of the greater gains of the disadvantaged group.

(3) The Effect of Work in Creative Movement:

In discussing the effect of creative movement on the progress of the disadvantaged experimental group, we note the findings quoted previously:

(a) The starting point of the disadvantaged group was much lower on all tests, as was their performance in the movement lessons (see Part Three, Research Results, page 47).

(b) The disadvantaged children were divided into two groups matched for intelligence, age and sex only. On most of the other measures, the initial scores of the disadvantaged control group was higher than those of the disadvantaged experimental group, though not significantly so (see Appendix No. 1(1) "before", page 85).

(c) The disadvantaged control group showed greater gains than did the middle class group. It is therefore likely that a "natural" accelerated development of the disadvantaged experimental group would have taken place without the movement treatment, when these children entered kindergartens using enriched syllabi and emphasizing the development of thought processes and concept formation. The findings of this study must be viewed in light of these considerations.

Some of the tests by which we evaluated the effect of the treatment were measures of general maturity and development (Bender, Bentler, Arithmetic Readiness Tests), and some were meant to test directly the internalization of concepts

dealt with throughout the treatment period (discrimination of forms, discrimination of directions, size-series concepts, spatial relationships).

Measures of the effect of treatment were obtained by comparing the rates of progress of the disadvantaged experimental group with those of the disadvantaged control group. Analyses of the findings revealed that the progress rates of the experimental group were almost always higher than those of the control group, although not always significantly so (see Table 7). A greater progress rate was found for the experimental group on nine sub-tests and a lower rate in only one sub-test. On a Sign Test this yields p. < .01.

Table No. 7

The Effect of the Treatment - Comparison of the Progress Rates of the Experimental and the Control Groups

		Culturally Disadvantaged Experimental Group[1] N = 31	Culturally Disadvantaged Control Group[1] N = 31	Significance of of the Difference[2]
Bender Test		8.17 **	4.37 **	+ **
Discrimination of Forms	+	0.80	0.53	+
	-	4.60 **	4.03 **	+
	Total	5.40 **	4.57 **	
Discrimination of Directions	+	-0.29	-0.29	=
	-	9.77 **	9.97 **	-
	Total	9.48 **	9.68 **	
Spatial Relationships	a	1.84 **	0.42	+ *
	b	0.39	-0.30	+
	Total	2.23 **	0.23	**
Series Test	"Toys"	20.84 **	11.16 **	+ **
	"Leiter"	13.03 **	12.19 **	+
	Total	34.93 **	23.87 **	
Goldschmid-Bentler Test	Behaviour	1.80	1.23 **	+
	Explanation	1.50	1.00 **	+
	Total	3.30 *	2.29 **	

* p = .10 ; ** p < .05 (t test)

1) The significance stars near the numbers relate to the significance of the difference "before-after" in the same group.

2) The significance stars relate to the gap in the differences between the two groups.

(+) and (-) in last column indicate whether there was greater progress by the experimental group as compared to the control group, on the Sign Test.

We will now analyze the tests in detail and compare the progress rates of the control and experimental groups.

A. The progress rate of the experimental group on the Bender Gestalt Test is significantly higher than that of the control group. The Bender is a recognized, validated index of general-development that includes measures of visual-motor development. Visual-motor perception, according to Bender, is closely connected with language ability and other intelligence functions, such as memory, visual perception, motor co-ordination, concepts of space, organization, etc.

B. A significant progress rate, similar for both groups, was found on tests dealing with discrimination of form and direction. Here we will attempt to explain why there was no differential effect of the treatment although a significant "natural" progress was evident. It seems to us that the numerous rotations we found on the Bender Test, which did not decrease in number throughout the experimental period, may partially explain the lack of a meaningful experimental effect on the ability to discriminate direction. It seems that the disappearance of the rotation phenomenon with increased maturity is a factor in successful task performance on the directions test. In our practical work we also realized that the children had difficulties in learning directions when the medium was their own body and when they had to "show" and "perform" the direction in relation to their own body and not with reference to an object or an external point. At the same time, they were often asked to "perform" directions facing a new front each time. It is possible that persistence of the "rotation" is responsible for this difficulty.

Likewise, it is possible that form discrimination is connected with the

quality of perception. It is also possible that the ability to transfer from concrete movement to the test situation was too large a demand. In our practical work we also found difficulties in learning form concepts through movement, because it is difficult to show precise forms and small differences between forms through body movement.

The fact that both groups showed significant progress on these tests, and that there was no differential effect of treatment, is due to factors that seem to develop "naturally" at this age. It is possible that we are facing the ability to take written tests and an insufficient development of the concept "as, like" that may be necessary for success on these tests. Additionally, we know that the kindergarten teachers dealt with these concepts a great deal in the kindergartens, so that both experimental and control groups benefited. At the same time, an evaluation of the relative amount of "treatment" time devoted to teaching the various concepts reveals that approximately half as much time was devoted to concepts of direction and form as to spatial relations and size.

C. Analysis of the Series Test, which deals with size and the ability to consider size as relative, revealed that the experimental group had progressed significantly more than the control group on the concrete part of the test (Series: Part A - toys). No signficant differences in progress were found on the abstract part of the test (Series: Part B) (see Evaluation Measures, page 43). It seems, therefore, that the treatment helped the experimental group children in the ability to manipulate "size" as long as the demands were concrete rather than abstract. The transfer to abstract

forms, as measured by the Leiter Test subtest we used, was too difficult for them. In this context, it should be noted that a great deal of time was devoted to work on concepts of size in comparison to the time allotted to work on other concepts. Size concepts were dealt with through changes in size of the shapes and the movements the children created with their own bodies, and through comparison of such changes with those of other children. Both methods can be seen as the study of size concepts in concrete objects. The children, therefore, revealed an ability to "transfer" body performance to widely differing concrete forms. No additional "transfer" to abstract forms was observed.

D. The experimental group showed significantly greater gains than the control group on the Spatial Relationships Test, as reflected in scores for the first part of the test and in the total scores. The fact that such greater gains were not found on the second part of the test as well might be due to the intervention of a more complex verbal intermediary. It should be mentioned that no "natural" progress in the knowledge of spatial relationships was found for the control group, this being the only area in which the group made no progress. On the other hand, significant gains were noted here for the experimental group. A relatively great amount of time was devoted to teaching the concepts of spatial relationships in the practical movement work, which may partially account for the significant group gains.

It may be possible to conclude tentatively that the two areas in which the experimental group showed significant gains - size and spatial relationships - are areas in which it is possible to accelerate, to a certain point, the process of concept acquisition and internalization, if the preconditions of basic maturity and readiness are met.

E. The Goldschmid-Bentler Test is a measure of conservation ability and development, and is frequently used in research for the age group we were studying. Although we attempted to develop the concept of conservation through movement we would have expected to observe the first signs of its internalization without any intervention. An analysis of Table 8 reveals that: a) At the beginning, the disadvantaged children scored at their appropriate age levels, while the middle class children scored the equivalent of one year above their age levels. (The test was standardized in the United States on middle- and lower-class population of Negroes and whites). b) During the half-year experimental period the disadvantaged children "skipped" one age category and reached the level of the middle class children, a rate of progress higher than that predicted for this age group. c) The experimental group did indeed progress more than the control group, but not significantly so.

Table No. 8

Goldschmid-Bentler Test - (Conservation) Mean Scores

A. Normative Population			
Age	5-5½	5½-6	6-6½
Size of Sample	36	38	34
Level of Achievement	0.55	2.39	3.38

B. Research Population	"Before"	"After"	Progress Rate
Age	5.4	5.9	-
Culturally Disadvantaged Experimental Group (N = 31)	0.55	3.87	3.32
Culturally Disadvantaged Control Group (N = 31)	1.1	3.45	2.35
Middle Class Group (N = 24)	3.0	4.83	1.83

We see, therefore, that contrary to our earlier conclusion, we did not succeed in producing significant additional internalization of concepts through body movement, when conditions of basic maturity and readiness were met. This leads us to conclude that although readiness and maturity are necessary pre-conditions for concept formation through movement, they alone are not sufficient. At the same time, we must regard this statement with some reserve, since we found that the sub-test on number conservation, an area to which we devoted several meetings, significant gains were found for the experimental group (see Table 9).

Table No. 9

Mean Achievements in the Goldschmid-Bentler Tests - Breakdown into Components

		Culturally Disadvantaged Experimental Group N = 31	Culturally Disadvantaged Control Group N = 31	Significance of the Difference 1)
A. Two-Dimensional Space	Behaviour	9	11	
	Explanation	9	8	
B. Number	Behaviour	15	6	*
	Explanation	12	4	*
C. Substance	Behaviour	11	6	
	Explanation	8	3	
D. Continuous Quantity	Behaviour	10	5	
	Explanation	8	8	
E. Weight	Behaviour	8	6	
	Explanation	4	2	
F. Discontinuous Quantity	Behaviour	4	4	
	Explanation	3	8	
TOTAL	Behaviour	56	38	
	Explanation	45	33	

1) * $p < .05$

A more detailed analysis of the conservation concept may help us discover which of its components tend to develop earlier, and which can be successfully taught through movement and transferred from the body to external objects. The significantly better performance of the experimental group over the control group on the "conservation of quantities" sub-test of the "Arithmetic Readiness Test" (see Table 10), also indicated that work with movement influenced progress in this area.

On those tests in which a significant difference was found between the gains of the experimental and control groups, progress was expressed as a percentage of the existing difference. This represents the amount of progress due to treatment as compared to the difference between the levels of the middle class and culturally disadvantaged populations. We wanted to estimate the amount of progress caused by the treatment as compared to the existing difference between the levels of the middle class and disadvantaged groups. This was done by calculating the gains in percentages of the existing difference on those tests which showed a significant difference between the gains of the experimental and control groups. The results indicate that the expected gap was reduced by 41% on the Bender Test, by 44% on the Series Test, and by 45% on the Spatial Relations test.

S u m m a r y: In summarizing the overall contribution of work in movement to culturally disadvantaged kindergarten children, we must look at the greater gains of the experimental group over the control group, by comparing their rates of progress on the various tests. Such a comparison should be considered in light of the "natural" development that would have taken place during the half-year

experimental period, and compared to the progress of the middle class children.

The main points can be summarized thus:

A. By relating to what happened in each group, we found:

1. The middle class group had significantly higher scores than the other groups at the end of the experimental period, although they made significant progress in three areas only: the ability to relate to sizes and proportions (Series Test), differentiation between various geometrical forms (Forms Test), and differentiation between directions (Directions Test).

2. The disadvantaged control group progressed (significantly) in all areas except for spatial relationship orientation ability (Spatial Relations Test).

3. The disadvantaged experimental group gained (significantly) in all areas (this gain was not significant on the more complex part of the Spatial Relations test and on some sub-tests of the Goldschmid-Bentler test), and scored higher than the disadvantaged control group.

B. Comparison of the progress rates of the groups revealed:

1. The progress rate of the disadvantaged control group was greater than that of the middle class group though not significantly so.

2. The progress rate of the disadvantaged experimental group is significantly greater than that of the middle class group in all areas except for conservation ability (Goldschmid-Bentler Test).

3. The progress rate of the disadvantaged experimental group is significantly greater than that of the disadvantaged control group in motor-visual development (Bender Test), spatial relations orientation ability (Spatial Relations test), ability to relate to sizes and proportions (Series test, concrete part) and in one

aspect of conservation ability (sub-test of the Goldschmid-Bentler Test).

In view of these findings, it can be assumed that while the disadvantaged children had developed in all areas, the middle class children had developed only in some areas during the half-year, while in other areas they were very close to the appropriate "age ceiling", so that a significant progress rate was not found. The culturally disadvantaged children, who were far from this ceiling, had developed at an accelerated rate as a result of entering kindergarten. Enriching experiences through movement instruction accelerated the development rate in some of the areas. A gap between the two populations of more than a half-year "developmental age", was still evident at the end of the research period, in spite of the "natural" development rate and in spite of the increase and acceleration it received through movement.

(4) Indices of Readiness for School:

In a research of this kind, which tries out a new method of advancing the intellectual development of culturally disadvantaged children, it is not sufficient to analyze the various test scores at the end of the research period. It is necessary to examine whether the children can apply the acquired concepts in school, where intellectual development is a central factor in success. Since such a follow-up was beyond the scope of this research, we will relate only to those indices which are known to be relevant to maturation and readiness for school.

The most prominent of these indices is the Bender Test, used in all counselling centers in this country as an index of school readiness. During the research period no learning took place which was directly linked to success on the Bender Test. Nevertheless, we found that not only was the progress rate of the entire experimental group higher than that of the control group, but their final scores

were higher than those of the controls. In fact, they came very close to the scores of the middle class group. On the other hand, a comparison of the final scores of the disadvantaged control group and the middle class group, reveals a "natural" backwardness greater than a half-year "developmental age". From this we may conclude that it is possible, to a given extent, to accelerate developmental processes through movement lessons, and thus to improve school readiness .

The second measure we used was the Arithmetic Readiness Test, which is also used in the guidance and counselling system for entrance to school. (See Introduction to Arithmetic Readiness Test (4)). For our research purposes, the test had several drawbacks. First, for various reasons, it could be administered only at the end of the treatment period. Second, the test has different norms for middle class and disadvantaged populations. Nevertheless, conclusions can be drawn from the test, even if they are incomplete. Analysis of Table 10 revealed that most of the mean scores of the disadvantaged children were closer to their population norm than were the scores of the middle class children. In this sense, the disadvantaged group was more representative of their population than was the middle class group who scored lower than expected on the basis of the test norms.

Table No. 10

Arithmetic Readiness Test - Mean Scores

Sub-Test	Culturally Disadv. Experim. Group N = 31	Culturally Disadv. Control Group N = 31	Middle Class Group N = 24	Significance of the Difference 2) Experim.-Contr
Counting	49.52	47.58	48.96	
Groups of Numbers and Fractions	53.07	51.45	44.38	
Ordinal Numbers	50.64	52.58	49.30	
Uni-Valence Co-ordination	45.32	43.71	41.67	
Conservation of Quantities	58.07	50.97	46.58	
Arithmetic Problems	45.64	43.20	44.18	
Total Grade	51.61	48.87	45.42	

1) The norms for the culturally disadvantaged children and for the middle class children are different.

2) * = p. < .05

For a comparison of the achievement of the culturally disadvantaged control group "post" with the middle class group "pre" see Appendix No. 1.

A comparison of scores of the disadvantaged experimental and control groups revealed higher scores for the experimental group, although not significantly so. Since the control group was initially somewhat superior to the experimental group on most of the research variables, it can be assumed that on this test also the final advantage of the experimental group stemmed from the influence of the experimental treatment. This is confirmed by the significantly higher scores of the experimental group on the conservation sub-test, which was definitely a direct result of the movement work.

In spite of certain reservations, the findings indicate that the work in movement contributed to the increase of the general and specific level of school readiness in the disadvantaged children.

4. Conclusions, Evaluations and Suggestions.

At the beginning we would like to remark upon the application of creative movement to educational work in general, and mention its relevance to work with disadvantaged children as well. This paper deals with one area in which creative movement was applied to educational work, that of concept formation and development of intellectual ability. One should be aware that there are other possibilities and aims, which may be achieved through the medium. These include, for example, development of physical and motor ability, the emotional experience and expression, development of imagination and creativity, development of sensitivity to others, working in groups and aesthetic education. Additional, and sometimes different, approaches and educational methods should be applied toward these aims.

The following points serve as a background to practical suggestions for utilizing creative movement as a means for promoting concept formation and developing

intellectual ability in disadvantaged kindergarten children:

(a) The medium of movement is essentially and especially suitable to disadvantaged children. This conclusion is based on: 1) the importance of psycho-motor activity to concept formation and intellectual development; 2) analysis of the special problems, bents and needs of culturally disadvantaged children in these areas; 3) impressions of teachers, kindergarten teachers, and our own research on the basis of practical work with culturally disadvantaged children of pre-school and school age.

(b) Test results revealed that in the half year of the creative movement program the experimental group had gained more than the controls. A significant differential influence of treatment was found in: the Bender Test, which is a recognized index of visual-motor development and tool for evaluation of readiness and maturity for school; spatial orientation and discrimination of sizes and proportions; and a specific aspect of conservation ability.

(c) The initial level of the disadvantaged kindergarten sample was very low when compared to the middle class sample of the same age. This was reflected in test results and performance during movement lessons. On the other hand, the tests revealed that these children developed at an accelerated rate after entering the kindergarten. Accelerated development in several areas was also observed during movement lessons. It is thus apparent that enrichment through creative movement may advance these children and help to close the gap between them and the middle class children.

Several conclusions and suggestions arose from our practical work with disadvantaged children in the course of the research. In principle, we believe that "learning" through movement should be an integral part of the general work in the

kindergarten and should not be a separate activity. This approach is expressed in the following points:

(a) There should be no pre-planned schedule for movement activity. The kindergarten teacher should activate the children in movement when she thinks and feels that the time and place are suitable and when the opportunity arises.

(b) Movement activity should be part and parcel of the curriculum, i.e. it should be used to teach subjects or concepts ordinarily dealt with in the kindergarten. A "curriculum" for movement which is separate from the general curriculum should not be adopted.

(c) Although we suggest that the kindergarten teacher activate the children in the specific programmed and directed movement method proposed in this research, the medium of movement must be regarded as a part of a general use of various stimuli, techniques and teaching methods which, when combined, can advance and develop the children.

(d) All the above leads us to conclude that activation of the children in the medium of movement should be directed by the kindergarten teacher and not by an outsider. Support to this conclusion is gained from the fact that young children in general, and disadvantaged children in particular, have difficulties in getting used to the different personalities, approaches and working methods of different people with whom they come in contact. Personal contact, unity and continuity of approach are important factors in the success of work with these children.

It would be necessary to give kindergarten teachers basic and suitable training in the use of the medium as proposed in this research. This training, in our

opinion, should be done in teachers' colleges and in-service courses for kindergarten teachers. The training should be thorough and extensive and should be conducted along the following lines:

(a) The kindergarten teachers should be given varied and extensive experience in the medium of movement.

(b) They should acquire the didactic and methodological skills which are suitable to and necessary for working in this medium with disadvantaged children.

(c) They should be taught the appropriate material, contents and subjects in the field of movement.

(d) They should be guided to apply and adapt the movement material to the general work in the kindergarten from the integral and combined approach suggested in this work. It is advised that this stage take place within the framework of practical work on the basis of "in-service" training.

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APPENDIX NO. 1

1) "Before"

		Means			Difference between the Means	
		Disadvantaged Experimental	Disadvantaged Control	Middle-Class	Experimental/ Control	Experimental/ Middle-Class
Age		5.41	5.47	5.38		
WPPSI:	Total IQ	89.45	89.26	114.22		
	Verbal IQ	89.35	91.07	110.70		
	Performance IQ	91.61	89.03	115.87		
Bender Test	Total	29.16	30.71	41.13	-	-
Discrimination of Forms	Total	0.47	1.33	7.04	-	-
	+	10.57	10.67	11.21	-	-
	-	10.10	9.33	4.17	-	-
Discrimination of Directions	Total	-9.71	-10.87	1.67	+	-
	+	7.55	7.81	7.25	-	+
	-	17.26	18.68	5.59	+	-
Spatial Relationships	Total	14.71	14.94	19.00	-	-
	a	9.19	9.26	[illegible].92	-	-
	b	5.52	5.68	7.10	-	-
Series Test	Total	106.00	122.10	151.17	-*	-
	Toys	62.10	77.36	88.35	-**	-
	Leiter	43.87	45.26	62.83	-	-
Goldschmid-Bentler Test	Total	0.55	1.16	3.00	-*	-
	Performance	0.52	0.97	1.77	-	-
	Verbal	0.03	0.19	1.23	-	-
Minkovich - Arithmetic Readiness Test	Total					
	Counting					
	Fractions					
	Ordinal nos.					
	Univalence					
	Coordination					
	Conservation of quantities					
	Arithmetic problems					

* = $P < .10$; ** = $P < .05$; (+) and (-) in the two last columns indicate whether there was greater progress by the experimental group as compared to the control group on the Sign Test.

2) "after"

		Means			Difference between the Means	
		Disadvantaged Experimental	Disadvantaged Control	Middle-Class	Experimental/ Control	Experimental/ Middle-Class
Age						
WPPSI:	Total IQ					
	Verbal IQ					
	PerformanceIQ					
Bender Test	Total	37.43	34.77	43.83	+	-**
Discrimination of Forms	Total	6.03	5.74	9.00	+	-
	+	11.39	11.10	11.37	+	-
	-	5.35	5.35	2.37		-
Discrimination of Directions	Total	-0.23	-1.19	5.17	+	-**
	+	7.26	7.52	7.25	-	
	-	7.48	8.71	2.08	+	-**
Spatial Relationships	Total	16.94	15.31	19.17	+*	-**
	a	11.03	9.68	12.79	+*	-**
	b	5.90	5.37	6.38	+	-
Series Test	Total	140.94	145.97	162.17	-	-**
	Toys	82.93	88.52	91.83	-*	-**
	Leiter	56.90	57.45	70.33	-	-**
Goldschmid-Bentler Test	Total	3.87	3.45	4.83	+	-
	Performance	2.33	2.19	2.79	+	-
	Verbal	1.53	1.26	2.04	+	-
Minkovich	Total	51.61	48.87	45.42	+	Cannot be compared (different norms for the two populations)
	Counting	49.52	47.58	48.96	+	
	Fractions	53.07	51.45	44.38	+	
	Ordinal nos.	50.64	52.58	49.30	-	
	Univalence Coordination	45.32	43.71	41.67	+	
	Conservation of quantities	58.07	50.97	46.50	+**	
	Arithmetic problems	45.64	43.20	44.18	+	

* = $P < .10$; ** = $P < .05$; (+) and (-) in the two last columns indicate whether there was greater progress by the experimental group as compared to the control group on the Sign Test.

3) "Before-After"

		Means			Difference between the Means	
		Disadvantaged Experimental	Disadvantaged Control	Middle-Class	Experimental/ Control	Experimental/ Middle-Class
Age						
WPPSI: Total IQ Verbal IQ Performance IQ						
Bender Test	Total	8.17	4.37	2.71	+**	+**
Discrimination of Forms	Total	5.40	4.57	1.96	+	+**
	+	0.80	0.53	0.17	+	+
	-	4.60	4.03	1.79	+	+**
Discrimination of Directions	Total	9.48	9.68	3.50	-	+**
	+	-0.29	-0.29	0.00		-
	-	9.77	9.97	3.50	-	+**
Spatial Relationships	Total	2.23	0.23	0.17	+**	+*
	a	1.84	0.42	0.88	+*	+
	b	0.39	-0.30	-0.71	+	+**
Series Test	Total	34.93	23.87	11.22	+	+**
	Toys	20.84	11.16	3.02	+**	+
	Leiter	13.03	12.19	14.25	+	+
Goldschmid-Bentler Test	Total	3.32	2.25	1.83	+	+
	Performance	1.80	1.23	1.00	+	+
	Verbal	1.50	1.00	0.73	+	+

* = $P < .10$; ** = $P < .05$; (+) and (-) in the two last columns indicate whether there was greater progress by the experimental group as compared to the control group on the Sign Test.

Appendix No. 2.

THE LIST OF CONCEPTS FROM WHICH CONCEPTS FOR WORK IN MOVEMENT WERE CHOSEN.

CONCEPTS OF FORM:

One dimensional - straight, curved, angular and twisted lines.

Two dimensional - round, oval, rectangle, triangle, square and various other shapes.

CONCEPTS OF SPACE:

Directions of lines in space - vertical, horizontal, diagonal and parallel lines.

Dynamic: Basic directions in space - forwards, backwards, upwards, downwards, to the right, to the left, diagonally.

Additional directions - inwards-outwards, open-close, around, back and forth, approach-retreat.

Static: Basic positions in space - behind, in front of, above, under, to the right of, to the left of.

Additional positions - opposite, next to, inside of, outside of, between, in the middle of, beyond, at the end of, near, far, around, high, low, at the side of.

Forms of organization in space - in pairs, lines, rows, circles, squares, triangles, random and undefined forms, scattered, crowded, uncrowded, symmetrical-asymmetrical.

CONCEPTS OF SIZE:

Basic concepts: small, big, medium, bigger than, the biggest, smaller than, the smallest. Increasing and decreasing series of sizes.

Additional concepts: Wide, narrow, high, low, thick, thin, long, short, much, more, less.

CONCEPTS OF QUANTITY:

Counting: From 1 to 10.

Ordinal numbers: first.....tenth.

Identification of a number with a quantity from 1 to 10.

GROUPS: Recognition of groups from 1 to 10.
Equal and unequal groups.
One to one and one to two matching between groups.
Group bigger than ..smaller than...
Addition and subtraction of groups.
Various combinations of groups.

Conservation of Quantity: In various groupings,
in dense and scattered groupings,
in different shapes within the body.

Description of quantities: all, some, a few, part of... more than, less than...

CONCEPTS OF TIME:

Concept of speed: quick-slow, changes in speed, various transitions from slow to quick.

Concept of rhythm: 2/2, 4/4, 3/4, 8/8, 16/16, 6/8.

Concepts of time: before, after, simultaneously, one after the other.

VOCAL DISCRIMINATION:

Sound-silence
Quick-slow, high pitch, low pitch, piano-forte
Rhythm

CONCEPTS OF FORCE:

Strong, weak, heavy, light

BASIC CONCEPTS OF MOVEMENT:

Run, walk, jump, skip, hop, gallop, trot, bend, tilt, extend, contract, move, stop.
Movement of the body, shapes in the body.

BODY AWARENESS:

Movement in the body, shape in the body - dynamic and static.
The parts of the body - identification, activation.
Moving parts of the body in isolation, moving the entire body.
Central parts - peripheral parts.
Lower part - upper part.
Lateral symmetry and asymmetry
Movement control.
Spatial orientation.